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UNITED STATES DEPARTMENT OF AGRICULTURE

In Cooperation with the
Idaho Agricultural Experiment Station

DEPARTMENT BULLETIN No. 1421

Washington, D. C. ▼ October, 1926

AN ECONOMIC STUDY OF IRRIGATED FARMING IN TWIN FALLS COUNTY, IDAHO

By

BYRON HUNTER, Associate Agricultural Economist, Bureau of Agricultural Economics, and
SAMUEL B. NUCKOLS, Associate Agronomist, Bureau of Plant Industry

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INTRODUCTION

Farmers of southern Idaho are constantly confronting the problems of what and how much to produce, how to produce it and how to dispose of the products to advantage. These problems are especially perplexing in the irrigated districts, because of the wide range of crops and livestock enterprises from which the farmers must choose in the organization and management of their farms and because of the constant changing of the prices of farm products. The investigation reported in the following pages was undertaken to obtain data that would be helpful in making these decisions.

The economic importance to Idaho of studies of this character is indicated by the rapid growth of irrigated farming within the State

This investigation was conducted cooperatively by the Division of Farm Management of the Bureau of Agricultural Economics and the Office of Sugar Plants of the Bureau of Plant Industry, United States Department of Agriculture, and the Idaho Agricultural Experiment Station.

The authors wish to thank for their assistance in the collecting of the field data, L. C. Acher, N. S. Wight, C. C. Taylor, F. H. Shelledy, R. Bristol, R. R. Rowell, L. N. Wilson, W. E. Schmid, A. K. Larson, H. B. Pingrey, and V. Brothers. The thanks of the authors and the departments making this study are extended also to the farmers from whom records were obtained and to others who helped to make the study possible by their hearty cooperation.

during the last quarter of a century as well as by the possibility of further growth in the future. In round figures the irrigated area of the State increased from 609,000 acres in 1900 to 2,489,000 acres in 1920 (figs. 1 and 2). Of the total acreage of improved land in

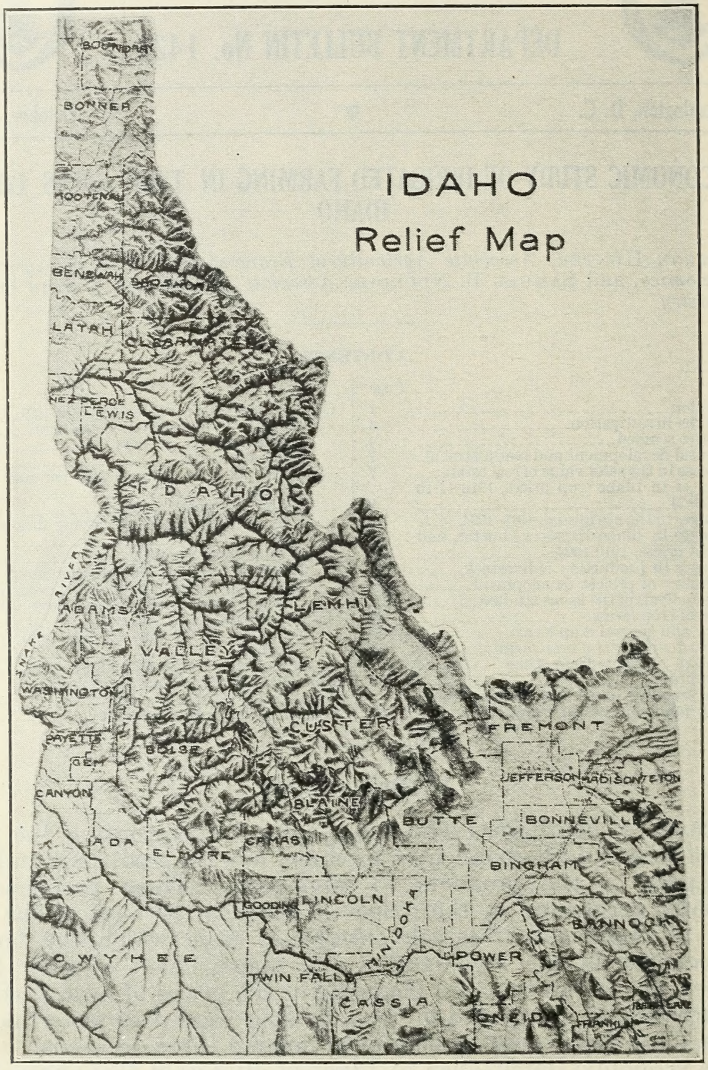

FIG. 1.—A large portion of the State of Idaho is rough and mountainous. Of the total area of the State, less than 16 per cent was in farms and less than 9 per cent was improved land in 1919. Of the total acreage in farms that year, only 54 per cent was improved land. (Map from the School of Mines, University of Idaho)

farms, 55 per cent was irrigated in 1920. In addition there still remain large areas of arid sagebrush land that is well adapted to irrigated farming, for which water will doubtless be provided in the future.

The information presented herewith should be of special interest (1) to the farmers of the Twin Falls south side irrigation project, where the study was made; (2) to the farmers of other irrigated dis-

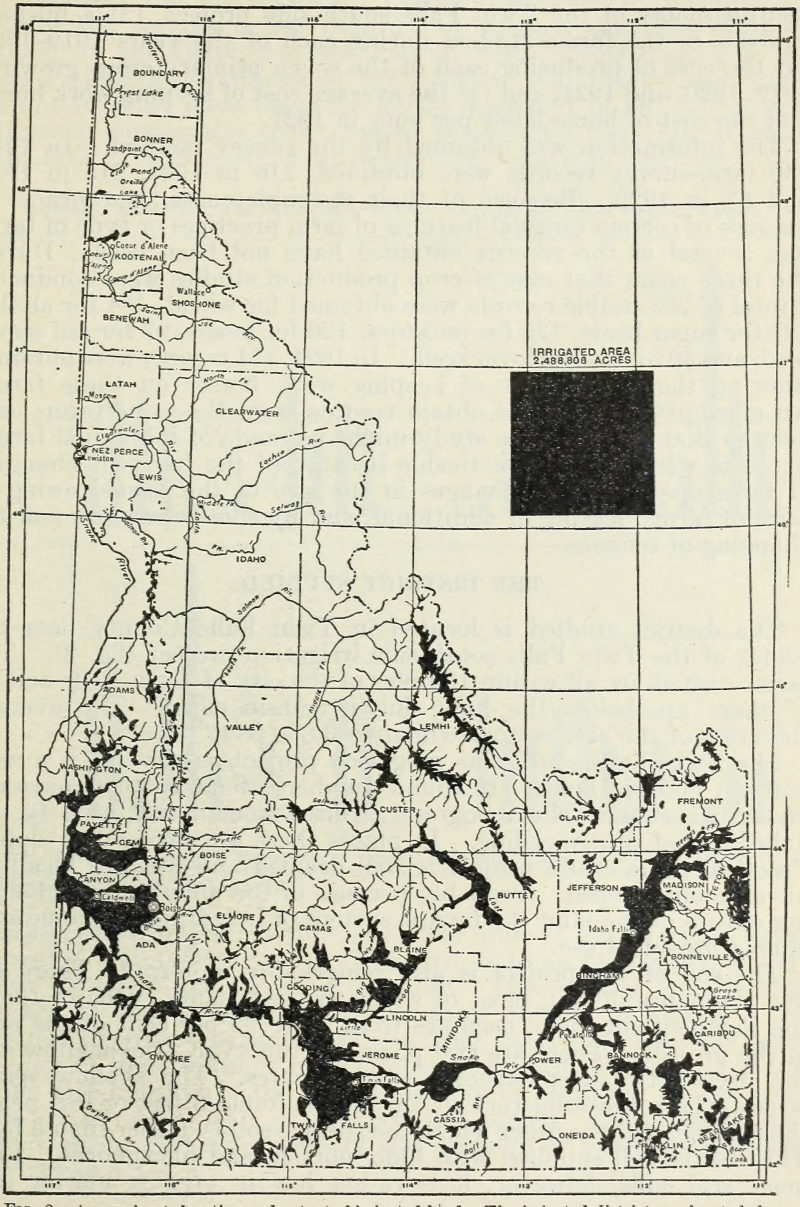

FIG. 2.—Approximate location and extent of irrigated land. The irrigated districts are located along the streams where water can be placed on the land most economically. Of the total acreage of improved land of the State, 55 per cent was irrigated in 1919. (From the Fourteenth Census of the United States Bureau of the Census)

tricts having soil and climatic conditions similar to those of the district studied; and (3) to the settlers who undertake to develop farms in new irrigated districts in the future.

SCOPE OF THE INVESTIGATION

The investigation covered a four-year period, 1919 to 1922 inclusive. It included (1) a study of the agricultural development and readjustments of the Twin Falls south side project, (2) a business analysis of the farms studied during each of the years 1919–1922, (3) the cost of producing each of the seven primary crops grown in 1919, 1920, and 1921, and (4) the average cost of keeping work horses and the cost of horse labor per hour in 1921.

The information was obtained by the survey method. In 1919, 230 farm-survey records were obtained, 216 in 1920, 215 in 1921, and 87 in 1922. Because of their incompleteness, inaccuracy, or because of certain unusual features of farm practices or type of farming, several of the records obtained have not been used. During the three years that cost of crop production studies were conducted a total of 233 usable records were obtained for wheat, 184 for alfalfa, 122 for sugar beets, 120 for potatoes, 120 for beans, 97 for red clover seed, and 30 for alsike clover seed. In 1921, 151 records were obtained showing the yearly cost of keeping work horses on these farms. An attempt was made to obtain records from the same farms each year so that a continuous study might be made of individual farms, but this was made impracticable because of the frequent changing of farm operators and changes in the size of the farms, owing to sales of farms, leasing of additional land by some operators and the changing of tenants.

THE DISTRICT STUDIED

The district studied is located in Twin Falls County near the center of the Twin Falls south side irrigation project (fig. 2). The farms visited are all within 10 miles of the city of Twin Falls and all of them are below the high line irrigation canal. The average elevation of the area is approximately 3,800 feet.

The Twin Falls south side irrigation project as a whole is a very uniform body of land.[1] In round numbers about 203,000 acres are under irrigation. The topography varies from nearly level to undulating and gently rolling. In places there are some steep slopes. Practically the entire project is well drained and but few localities have become seeped. Probably because of the undulating and sloping nature of the land the furrow system of irrigating has come into almost universal use.

The soil of the project is also remarkably uniform.[2] There are but few types of soil, most of which are silt loams. One of these, the Portneuf silt loam, occupies from 90 to 95 per cent of the area of the project. There are two phases of this type—the shallow and the deep. The deep strongly predominates. The shallow phase occurs where the solid rock or hardpan is found 3 feet or less below the surface, and the other where the surface soil is deeper than 3 feet. This soil is well supplied with lime, potash, and phosphorus. Like most arid soils, however, it is rather low in organic matter and nitrogen.

[1] For a discussion of the geography and geology of this region see Bulletin No. 199, U. S. Geological Survey: Geology and Water Resources of the Snake River Plains of Idaho.

[2] For a discussion of the soils of the district studied see Advance Sheets-Field Operations, Bureau of Soils, 1921: Soil Survey of the Twin Falls Area, Idaho.

The monthly precipitation for the four years of this study and the normal monthly precipitation are shown in Figure 3. The district has the characteristic inter-mountain type of rainfall—very dry summers and wet winters. The average monthly precipitation of July and August is less than 0.5 of an inch and that of June, September, and October is less than an inch. Table 1 presents the general climatic conditions of the district. On the average there are but 76 rainy days (days having at least 0.01 of an inch of precipitation) during the year. Six of these rainy days fall in June, 3 in July, 2 in August, 4 in September, and 5 in October. Fair

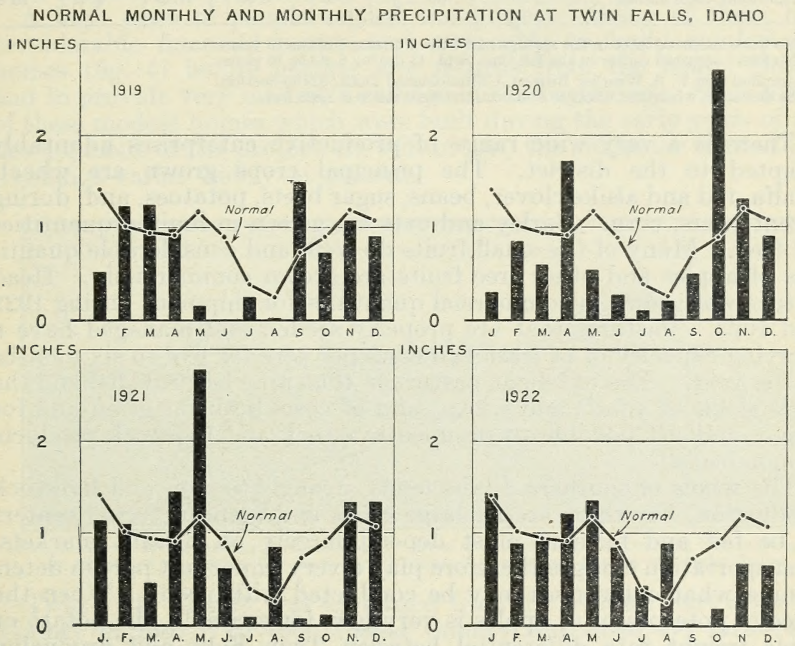
NORMAL MONTHLY AND MONTHLY PRECIPITATION AT TWIN FALLS, IDAHO
INCHES
1919
Normal
J F M A M J J A S O N D
INCHES
1920
Normal
J F M. A M. J J A. S. O. N. D.
INCHES
1921
Normal
J. F. M. A. M. J. J. A. S O N. D.
INCHES
1922
Normal
J F M A M J J A S O N D

FIG. 3.—This district has the Pacific type of rainfall, dry summers and wet winters. During the years 1919, 1920, and 1921, the monthly precipitation varied greatly from the normal. (Compiled from reports of the Weather Bureau)

weather, therefore, usually prevails when most of the crops are being harvested. In 1920, however, there were 14 rainy days in September, 12 in October, and 12 in November. This caused considerable damage to the bean crop and the third cutting of alfalfa. The length of the frost-free period, as seen from Table 1, is about 129 days. Because of the variations in the dates of the last killing frost in the spring and the first in the fall, crops may be damaged by low temperature at either end of the growing season. Occasionally hail storms sweep across the country and do more or less damage where they strike.

TABLE 1.—*Climatic conditions, Twin Falls, Idaho, 1913–1922*

Item	1919	1920	1921	1922	Average 1913–1922
Maximum temperature ° F.	101	100	98	101	100
Minimum temperature ° F.	−15	−5	−1	−30	−9
Mean annual temperature ° F.	47.4	47.3	48.7	45.8	46.0
Mean temperature, Apr. 1 to Sept. 30 ° F.	61.6	59.3	59.0	60.8	60.6
Last killing frost in spring [1]	June 1	June 1	May 12	May 27	June 2
First killing frost in fall [2]	Oct. 10	Oct. 16	Sept. 12	Sept. 29	Sept. 13
Days free of killing frost number	131	137	123	125	129
Rainy days do	79	89	81	88	76
Precipitation Apr. 1 to Oct. 31 inches	3.53	5.99	5.95	4.87	5.03
Precipitation, total annual do	8.53	9.93	11.29	9.41	10.83

[1] No frosts occurred later in the spring than June 2 during 8 of the 10 years.
[2] No frosts occurred earlier in the fall than Sept. 13 during 8 of the 10 years.

Compiled fron U. S. Weather Bureau, Climatological Data, Idaho Section.
The elevation where the weather observations were made is 3,825 feet.

There is a very wide range of productive enterprises admirably adapted to the district. The principal crops grown are wheat, alfalfa, red and alsike clover, beans, sugar beets, potatoes, and, during recent years, corn. Barley and oats are grown in limited quantities for feed. Many of the small fruits do well, and considerable quantities of apples and other tree fruits are grown commercially. Head lettuce was grown in commercial quantities for shipment during 1922 and 1923. Pastures that are properly seeded and managed have a carrying capacity of at least two cows per acre for five to six months of the year. The excellent pasturage that may be provided and the high yields of alfalfa and wheat, and of corn, both for grain and for silage, make it possible to produce livestock and livestock products economically.

The whole of southern Idaho tends strongly to crop and livestock production, but there are no large cities and manufacturing centers to be fed and farmers must depend largely on distant markets. Transportation charges therefore play a very important part in determining what enterprises may be conducted with profit. When the price of potatoes or of apples is very low, for example, the potato or apple freight rate differential between Twin Falls and producing areas located near consuming centers may be sufficient to make it impossible to market the crop with profit. This was the condition in 1922, when approximately one-third of the potato crop and a considerable portion of the apple crop were never harvested.

All of southern Idaho is served by a single railroad (the Oregon Short Line) and its branch-line feeders. One of these branches serves the Twin Falls south side project. It leaves the main road of the Oregon Short Line at Minidoka, enters the project at its eastern border and has its terminal at Buhl, near the western border of the project. Another branch line leaves the Minidoka-Buhl line at Twin Falls and runs south to Wells, Nev., a distance of 119 miles, thus connecting with the Southern Pacific Railroad. This gives a direct outlet from the Twin Falls south side project to the California markets.

AGRICULTURAL DEVELOPMENT AND READJUSTMENT

When the land contained in the Twin Falls south side irrigation project was opened for homestead entry in 1904, it formed the western part of Cassia County, Idaho. The project was developed under the Carey Act and water for irrigation was available in the spring of 1905. The homesteaders paid the State of Idaho 50 cents per acre for the raw sagebrush land. They also paid $25 per acre for the construction of the irrigating system. In addition, they have paid the operating and maintenance charges, and from time to time assessments have been made for improvements and for drainage.

A high class of people settled the project. Some of them had considerable financial means and were able to build comfortable homes (fig. 4) before getting any returns from the land. Others had to provide very modest dwellings in the beginning. Since many of these modest homes which were built during the early years of the development of the project are still in use, the character of the farm dwellings varies widely at present.

FIG. 4.—One of the better-equipped farmsteads. Good dwellings are not uncommon but good barns are somewhat rare because the scant rainfall makes it unnecessary to store hay under shelter

Twin Falls County was organized from the western part of Cassia County in 1907. In 1900 Cassia County contained 477 farms and had a population of 3,951. At that time very few of the farms were located in the western part of the county. By 1910 Twin Falls County had 1,295 farms and a population of 13,543. In 1920 the number of farms had increased to 2,746 and the population to 28,398. Ninety-five per cent of the farms were irrigated in 1919 and the total acreage under irrigation that year was 261,622 acres. Of this total the Twin Falls south side irrigation project contained approximately 203,000 acres.

INCREASE IN THE SALES VALUE OF REAL ESTATE

Figure 5 shows the sales value of real estate within the district studied by two-year periods from 1905 to 1922. In taking the survey records, farmers were asked when they purchased their farms and the price paid. There were 10 sales in the first two-year period (1905–6), 17 in the second, 15 in the third, 19 in the fourth, 19 in the fifth, 30 in the sixth, 62 in the seventh, 59 in the eighth, and 8 in the ninth.

In the beginning the land was covered with a medium to heavy growth of sagebrush. Before crops could be raised the land had to

be cleared and leveled sufficiently to permit of irrigation. Ditches for delivering the water from the canals to the land also had to be built. In considering the sales value of the land as shown in Figure 5, it should be remembered that the sales for the earlier years, in the main, represent land that was but little improved. In some cases it represents only the relinquishment of the homestead right. The sales made during the later years generally represent well-developed land with buildings and a paid-up water right. The increase in land value, therefore, is partially due to the addition of improvements.

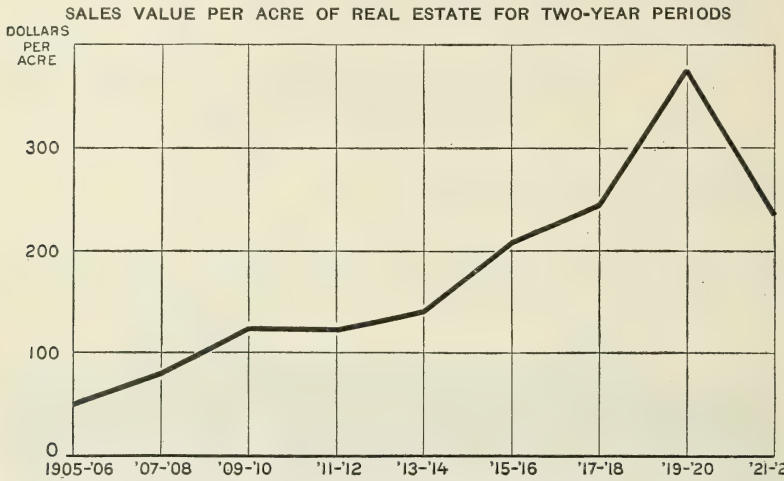

FIG. 5.—The values of real estate for the earlier years covered by this figure are for raw land or land that was little improved; for the later years the values usually represent well-developed farm land

CHANGES IN IDAHO CROP PRICES, 1910–11 TO 1923–24

Average prices to producers in Idaho are shown in Table 2 for wheat, oats, barley, clover seed, and potatoes from 1910–11 to 1923–24; for beans and sugar beets from 1911–12 to 1923–24; and for alfalfa hay from 1915–16 to 1923–24. Yearly average prices were obtained by weighting the average monthly prices for each year according to the monthly movement of each crop to market. Figure 6 presents these prices, except for alfalfa hay, in percentages of base prices. Averages from 1910–11 to 1914–15 are the base prices used for all crops except beans and sugar beets. For these two crops, averages from 1911–12 to 1914–15 furnished the base. Since no prices for alfalfa hay are available prior to 1915–16, alfalfa is omitted from Figure 6. There probably was some variation between average prices for the State as a whole and the prices Twin Falls farmers received, but the data presented in Table 2 and Figure 6 should reflect price conditions at Twin Falls very closely.

TABLE 2.—*Estimated average prices to producers in Idaho, for specified crops, 1910–11 to 1923–24*

Year beginning Aug. 1	Wheat per bushel	Oats per bushel	Barley per bushel	Clover seed per bushel	Potatoes per bushel	Beans per bushel	Sugar beets per short ton	Alfalfa hay per short ton
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1910–11	0.76	0.43	0.55	7.93	0.77			
1911–12	.67	.43	.69	8.72	.74	2.60	5.02	
1912–13	.67	.35	.55	8.11	.34	2.72	5.18	
1913–14	.66	.36	.52	7.02	.53	2.57	4.99	
1914–15	.80	.38	.53	7.77	.55	2.79	4.96	
Average 1910–11 to 1914–15	.71	.39	.57	7.91	.59	[1] 2.67	[1] 5.04	
1915–16	.80	.38	.53	9.12	.64	2.99	5.08	9.54
1916–17	1.30	.54	.70	9.22	1.38	4.51	6.16	15.62
1917–18	1.88	.79	1.06	12.40	.80	6.58	7.06	15.17
1918–19	1.96	.88	1.30	18.24	.81	5.68	10.00	17.32
1919–20	2.10	.97	1.41	25.50	2.10	4.17	11.00	24.26
1920–21	1.74	.68	1.20	13.85	.87	3.27	12.10	11.36
1921–22	.81	.37	.55	9.51	.93	2.78	6.00	6.83
1922–23	.84	.49	.62	9.93	.47	3.18	8.28	10.11
1923–24	.79	.46	.63	11.11	.65	3.54	7.21	9.46

[1] Averages 1911–12 to 1914–15.

The yearly prices were obtained by weighting the monthly prices according to the monthly movement of the respective commodities to market.

Compiled from data of Division, of Crop and Livestock Estimates, Bureau of Agricultural Economics.

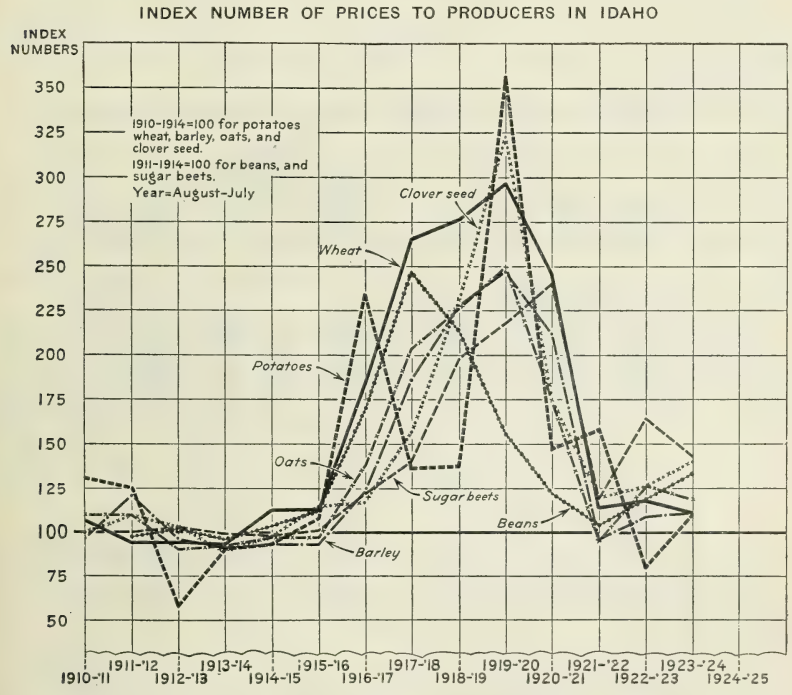

FIG. 6.—The crop year begins August 1. With the exception of potatoes, prices were fairly stable prior to and including the crop year 1915–16. Since that year price changes have been rather violent. (Compiled from the reports of the Division of Crop and Livestock Estimates)

Prices, it is seen from Table 2 and Figure 6, remained fairly stable from 1910–11 to 1915–16 with the price of potatoes the only exception. From 1916–17 to 1923–24, on the other hand, prices fluctuated widely. The price of each crop advanced during the crop year 1916–17. With the exception of potatoes and alfalfa hay the price of each crop advanced again in 1917–18. There was a very marked divergence, however, in the rate at which the prices of the respective crops increased and these violent price changes greatly affected the agricultural equilibrium of the district and caused marked changes in the relative acreage devoted to the respective crops.

CHANGES IN THE USE OF LAND, 1913–1924

The Twin Falls south side irrigation project has now passed through 20 crop seasons. During this time many shifts have been made in the relative acreage devoted to the individual crops grown. In old and well-established farming communities, experience shows what crop and livestock enterprises are best adapted to local conditions and what crop yields, on the average, may be expected.

It must be remembered that the district under consideration is new and passing through the formative period. In the beginning the settlers lacked the background of experience. They had to learn (1) what crop and livestock enterprises are adapted to the conditions of the project; (2) how to grow each crop under irrigation; and (3) what products could be disposed of in the available market. Under these circumstances considerable shifting in the use of land should be expected.

Wheat, oats, barley, and alfalfa were the principal crops grown during the early years of the project. It was customary to grow one or more small-grain crops in the beginning, the land being leveled each time a crop was planted. As soon as the land was sufficiently level to permit the irrigation water to flow fairly uniformly and not collect in depressions, alfalfa was planted. In a few years so much alfalfa was produced that hay became very cheap and the growing of other crops soon followed.

No definite information concerning the acreages devoted to the respective crops and to pasture for the project as a whole is available prior to 1912, at which time the Twin Falls Canal Co., began taking a crop and livestock census. The annual reports of these census enumerations furnish the data presented in Figure 7. The percentages of the crop and pasture land of the entire project that has been devoted to the individual crops and to pasture from 1913–1924 are shown in Figure 7.

The causes of the changes in the use of land can be pointed out only in part. Average crop yields for the project are not available except for the years 1919–1922, inclusive (Table 11); the prices presented in Table 2 should be considered only as very close approximations of the prices received by Twin Falls farmers; and cost-of-production data are available only for the years 1919, 1920, and 1921. For these reasons no comparison can be made of the net returns per acre of the respective crops for the years prior to 1919.

In considering the changes in the use of land that have taken place, it should be kept in mind that each crop frequently serves some important function in addition to returning a cash value. A few examples will assist in making this point clear: (1) The usual method

PERCENTAGE OF CROP AND PASTURE ACREAGE DEVOTED TO THE RESPECTIVE CROPS AND PASTURE ON THE TWIN FALLS SOUTH SIDE IRRIGATION PROJECT

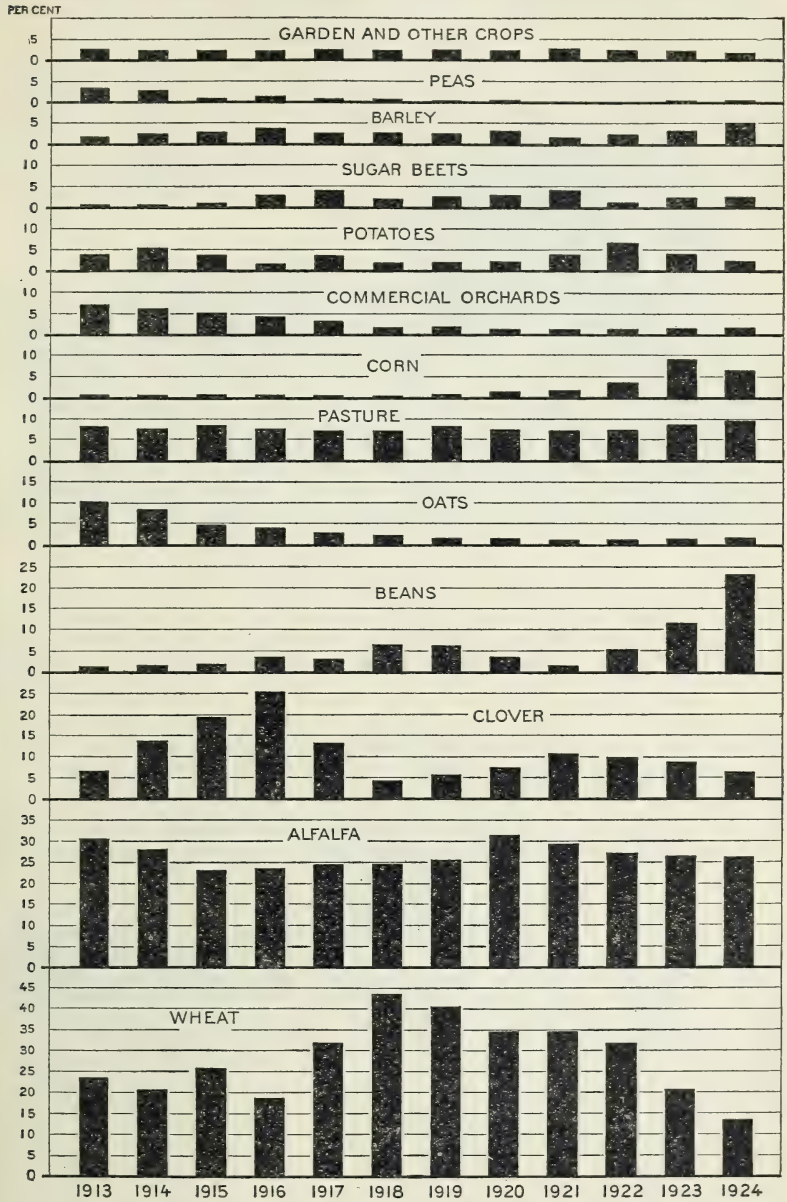

FIG. 7.—The percentages of the combined crop and pasture acreage that were devoted to the respective crops and to pasture during the years 1913–1924 are indicated by the perpendicular bars and the figures opposite the respective crops. The variations in the prices of farm products, the changing of freight rates, the variations in the losses due to plant diseases and insect pests, and the competition of other producing areas are some of the factors that have caused shifts in the relative acreages devoted to the different crops. (Compiled from the annual reports of the Twin Falls Canal Co.)

of getting a stand of alfalfa and clover is to seed them in the early spring with wheat, oats, or barley. Obtaining a stand of clover or alfalfa may be the chief reason for growing the grain crop. (2) Alfalfa, clover, and beans have the ability to fix atmospheric nitrogen, and for this reason the production of these crops may increase the yield of subsequent crops very materially. This may be of greater importance than the cash value of the crops produced. (3) Sugar beets, potatoes, beans, and corn are row-tilled and it is frequently necessary to place one of them in the rotation or cropping system in order to keep weed pests under control.

THE SMALL-GRAIN CROPS

Wheat, oats, and barley require practically the same cultural operations and there is little difference in their acre cost of production. Each of these crops may be used also as the nurse crop for starting alfalfa and clover. In other words, they are competitive crops. For these reasons the changes in the acreages devoted to these three crops will be discussed as a group.

Wheat.—During the 12-year period, 1913–1924, wheat has occupied a greater percentage of the combined crop and pasture land than any other crop with alfalfa a close second. During the first four years of this period there was considerable variation in the acreage devoted to wheat. The wheat acreage was rapidly increased from 1916 to 1918. This rapid increase was doubtless due to the assurance of an attractive price and the urgent request of the Federal Government for an increased total production of this crop. From 1918 to 1924 there was a steady decline in the acreage and importance of wheat. In 1924 only 14 per cent of the combined crop and pasture area of the project was in wheat, whereas in 1918 there was 43 per cent.

As a feed crop wheat outdistances both oats and barley. When expressed in pounds per acre the average yields of these crops on the farms studied in this investigation from 1919 to 1922 were as follows: Wheat, 2,580 pounds; oats, 1,568 pounds; and barley, 2,064 pounds. It is apparent, therefore, why wheat has become the prominent small-grain crop of the project.

Oats.—During the early years of the project, oats were an important crop. While the irrigating system was being constructed there was a demand for considerable horse feed. This provided a local market for oats. As this local demand diminished and as farmers became able, through their experience, to compare the yields and acre values of wheat, oats, and barley, the relative acreage of oats began to decline. In 1912 approximately 14 per cent of the land in crops and pasture was in oats and in 1913 but 10 per cent. This decline continued for several years and since 1918 less than 2 per cent has been in oats.

Barley.—Barley, like oats, is grown for local consumption. For this reason it has never become an important crop. In only one year since 1912 has as much as 5 per cent of the crop and pasture land been occupied by barley. This was in 1924. The other extreme was 1.6 per cent in 1913 and again in 1921.

ALFALFA

Alfalfa has been a very prominent crop from the beginning of the agriculture of the project. It is the chief hay and soil-building crop

and there has been little change in its relative importance during the last 10 years. The percentage of the crop and pasture land devoted to alfalfa has varied from 23 per cent in 1915 to 31 per cent in 1920,

FIG. 8.—A common method of stacking alfalfa hay

and the average for the 12-year period is 27 per cent. The relative importance of no other crop has changed so little as that of alfalfa. Common methods of stacking and feeding alfalfa hay are shown in Figures 8 and 9.

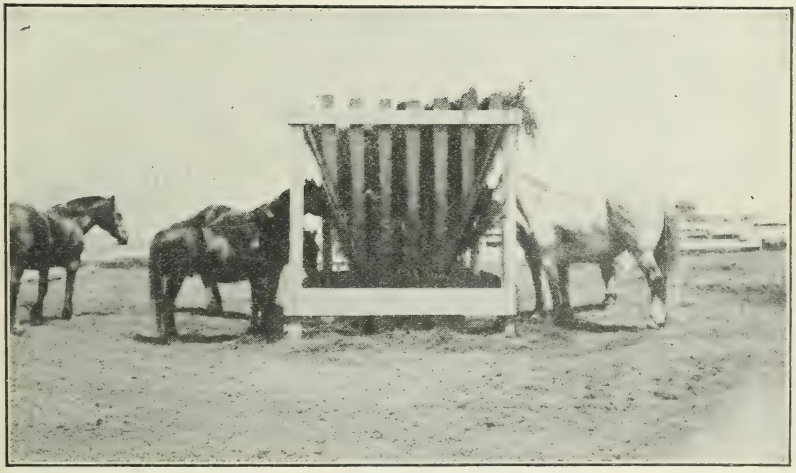

FIG. 9.—A wagonload of hay is thrown into the rack and the animals are allowed to help themselves

CLOVER

As presented in Figure 7, clover includes red, alsike, and white clover. One cutting of hay (about 1 ton) and a seed crop are obtained from red clover, while alsike clover and white clover are grown entirely for the seed crop.

The acreage devoted to these three clover crops increased very rapidly from 1913 to 1916, because it was found that this district is well adapted to the production of heavy yields of clover seed, and prices for seed were reasonably good. In 1917 and 1918 there was a rapid decrease in the clover acreage, owing partly to the desire to increase the acreage of wheat, and partly to the difficulty in controlling the clover aphis, which became a serious pest. The high prices of clover seed in 1918 and 1919, it would seem, had some influence in causing the increase in the clover acreage in 1920 and 1921.

THE ROW-TILLED CROPS

Potatoes, sugar beets, beans, and corn are the row-tilled crops of the project. These crops are competitive; that is, one crop may be substituted for any of the others in the rotation and cropping systems of the project by making minor adjustments in the farm operations. It is of interest, therefore, to note how the relative acreages devoted to potatoes, sugar beets, and beans (prior to 1922 corn occupied a very minor position) have seesawed back and forth during the 12-year period, 1913–1924, as shown in Figure 7. These changes may be considered as the expression of the efforts of farmers to find the most remunerative crops to grow. The constant changing of prices, the variations of yields from farm to farm and from year to year and the differences in their acre cost of production are the chief factors which have prevented farmers from arriving at a fairly accurate judgment as to the relative merits of these crops.

Potatoes.—The estimated average price received for potatoes fluctuated more violently during the 14-year period covered by Table 2 and Figure 6 than did the price of any of the other crops. These violent changes in price seem to have been followed by corresponding changes in the potato acreage. For example, the estimated price received for the 1912 crop was low and relatively low for the 1913 and 1914 crops. The potato acreage was materially reduced in 1915 and again in 1916. The estimated price received for the 1916 crop was extremely high when compared with the prices received for the other crops and in 1917 the potato acreage was more than doubled. The price received for the 1917 crop fell to a lower level than that of any of the other crops and remained at this low level for the crop grown in 1918.

The average peak price of the 14-year period ($2.10 per bushel) was reached for the crop grown in 1919. The high price obtained for this crop seems to have had but little influence on the acreage planted in 1920, for the increase was slight. It is believed that the extremely high price of seed potatoes in the spring of 1920 ($3 to $6 per bushel) deterred many from planting potatoes.

In 1921 the acreage of potatoes was increased nearly 75 per cent although the average price received for the 1920 crop was relatively low. The price received for the 1921 crop was high when compared with the prices received for other crops and in 1922 the potato acreage was increased about 70 per cent. The price received for the 1922 crop dropped to a very low level and the acreage was materially reduced in both 1923 and 1924.

The irrigation and harvesting of potatoes are shown in Figures 10 and 11.

Sugar beets.—Sugar beets are grown under contract, and prior to 1922, farmers knew definitely at planting time what price they were to receive. The 1922, 1923, and 1924 crops were grown under a sliding-scale contract, the final price depending on the returns received for the sugar made from the beet crop. Because the crop was grown

FIG. 10.—Potatoes are irrigated from three to five times during the growing season

under a definite contract, sugar-beet growers (prior to 1922) were not so much subjected to speculative conditions as were the potato growers.

The price received for the 1916 sugar-beet crop was considerably higher than that received for the previous crop. The price in-

FIG. 11.—Harvesting the potato crop

crease continued each year until 1920 when the peak price of $12.10 per ton (State average) was reached. The price received for the 1921 crop fell to $6 per ton. Under the sliding-scale contract the price received for the 1922 crop advanced to $8.28 per ton and then dropped back again to an average of $7.21 per ton for the 1923 crop.

A study of Table 2 and Figure 7 shows there is not the close relation between the price and the acreage of sugar beets that exists between the potato price and potato acreage. Sugar-beet yields fluctuate from year to year more widely than do potato yields. Variation in yield may have even more influence on changes in acreage than has variation in price.

In 1915 the average yield of all sugar beets delivered to the sugar factory at Twin Falls was about 25 per cent above the 10-year average, 1914–1923. In 1916 and 1917 the acreage devoted to sugar beets was materially increased. The increase in the price received for these two crops lagged considerably behind the increase in the price received for all other crops, with the exception of that received for the 1917 potato crop. The average yield of beets during these two years was about 1 ton below the 10-year average, and in 1918 the acreage devoted to sugar beets was reduced a little

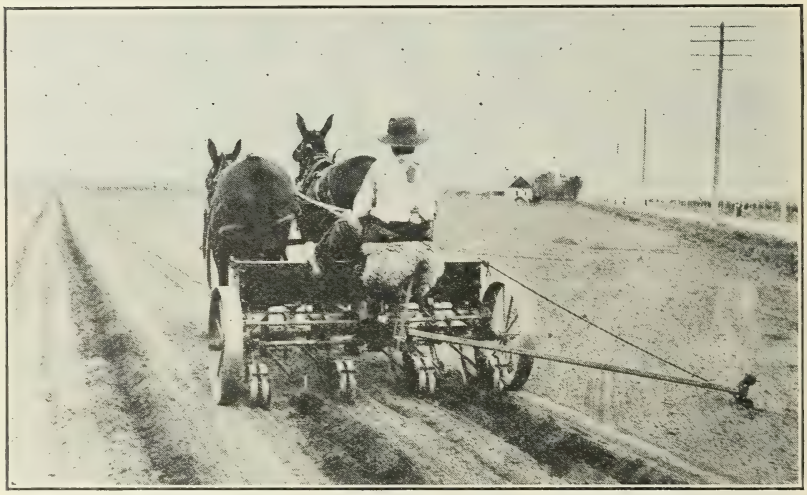

FIG. 12.—Four rows of sugar beets are planted and every other row furrowed out for irrigating at the same operation

more than 50 per cent. The beet acreage then increased from 1919 to 1921. The price received for the 1921 sugar-beet crop dropped from $12.10 to $6 per ton and the yield to about 70 per cent of the 10-year average. This made beets a very unprofitable crop and in 1922 the beet acreage was but 26 per cent of the 1921 acreage. High yields and better prices were obtained in 1922 and 1923 and the acreage increased again in 1923 and 1924.

The usual method of planting sugar beets is shown in Figure 12.

Beans.—The price of beans began to advance in 1915 and the peak average price of $6.58 per bushel was for the 1917 crop. At that price, the cost studies indicate, beans were the most profitable crop grown in 1917. As a result the acreage occupied by beans in 1918 and 1919 was about double the 1917 acreage. From the high level attained in 1917, the price of beans gradually declined each year until an average of $2.78 per bushel was received for the 1921 crop.

In response to the drop in price, the acreage also dropped more than 70 per cent from 1919 to 1921. In 1922 the acreage of beans was more than doubled, the price advanced more than 10 per cent and the yield obtained was more than 60 per cent above the average yield of the three preceding years. The high yield and the advance in price made beans a very popular crop in 1922. The increase in the acreage in 1923 and 1924 indicates the continued popularity of the crop. Cultivation of beans is shown in Figure 13.

Corn.—Corn occupied a very minor position in the cropping system of the project prior to 1922. That year nearly 4 per cent of the crop and pasture land was in corn and a little more than 9 per cent was in corn in 1923. In the beginning of the development of the project, it was generally believed that the climatic conditions were not suited to the production of corn. A few, however, persisted in growing small acreages. As a better knowledge of how to produce

FIG. 13.—Beans are generally cultivated with a four-row beet cultivator

the crop under irrigation was gained and as varieties better adapted to the climatic conditions were developed, the yield per acre increased. There is little definite information as to the rate of increase. On the Boise reclamation project (see annual reports of the Bureau of Reclamation), 150 miles to the northwest, the average yield of corn increased from 21 bushels per acre in 1912 to 55 bushels in 1923. The swing to corn in 1922 and 1923 was due (1) to a greater appreciation of the possibility of growing more feed per acre with corn than with any other grain crop, and (2) to a greater need for feed because of the increase of livestock on the project. The acreage grown in 1923 was somewhat in excess of the local need, and in 1924 the crop was materially reduced.

Peas.—Field peas occupied 3.5 per cent of the crop and pasture acreage in 1913. The crop then declined in importance and since 1917 less than 1 per cent of the combined crop and pasture land has been devoted to this crop.

COMMERCIAL ORCHARDS

Commercial orchards, especially apple orchards, were planted extensively in the beginning of the development of the project. Unfortunately, too many varieties were planted, some of which were of inferior quality. By the time the orchards came into bearing, some of the new varieties had become popular. This made sales difficult for those having the inferior varieties, except during years of light production. Many of the orchards were neglected. Some of them were operated in connection with general farming by men who would not learn the necessary details of apple growing and

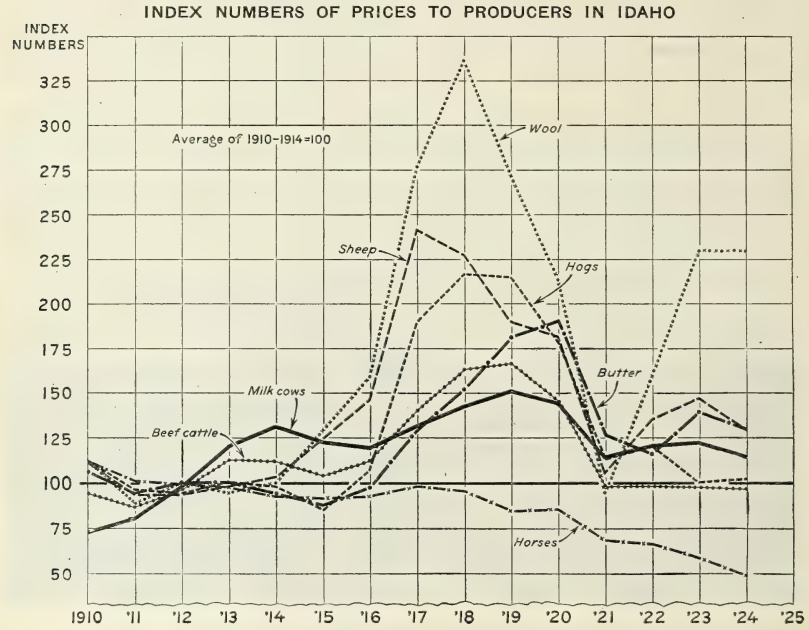

FIG. 14.—The index numbers in this figure are on the calendar year basis, whereas those in Figure 6 are on a crop-year basis. Like crop prices, most of the livestock prices fluctuated violently from 1916 to 1924

marketing. Even some of the strictly apple farms were neglected. Up to 1917 most of the marketing was done under the consignment system and the financial returns were often very unsatisfactory. The great distance to the principal apple markets makes competition stiff during years when the crop is heavy in the eastern States. These are some of the conditions and circumstances which led many apple growers to become so discouraged that they pulled up their trees and engaged in general farming. In 1913 approximately 7 per cent of the crop and pasture land was in commercial orchards. For several years the proportional orchard acreage decreased and since 1917 less than 2 per cent has been in commercial orchards.

GARDEN AND OTHER CROPS

In Figure 7 the family garden, the family orchard, and a few minor crops, such as onions and head lettuce, are grouped together under "Garden and other crops." The figure shows no radical changes in the proportional acreage devoted to this group from 1913 to 1924.

PASTURE

The permanent pastures of the project are mostly seeded to bluegrass. Ladino clover, one of the newly introduced pasture crops, shows promise of replacing some of the blue grass. During the period covered by Figure 7, the relative acreage devoted to pasture remained fairly constant. In response to the increase in livestock in 1923 and 1924, the pasture acreage was slightly increased during these two years.

CHANGES IN IDAHO LIVESTOCK, BUTTER, AND WOOL PRICES, 1910–1924

Average prices to producers in Idaho are shown in Table 3 for milk cows, butter, hogs, horses, sheep, and wool for the years 1910 to 1924, inclusive. The yearly prices for milk cows and horses are the averages of the monthly prices. The yearly prices for the other commodities were obtained by weighting the monthly prices according to the monthly movement of each commodity to market. Figure 14 presents these prices in percentages of base prices. The base used for each commodity is the average of the 1910 to 1914 prices.

TABLE 3.—*Average prices to producers in Idaho for milk cows, butter, hogs, horses, sheep, wool, and beef cattle, 1910–1924*

Year	Milk cows per head	Butter per pound	Hogs per 100 pounds	Horses per head	Wool per pound	Sheep per 100 pounds	Beef cattle per 100 pounds
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1910	43	0.33	7.96	148	0.19	4.83	5.04
1911	47	.29	6.84	133	.15	4.06	4.63
1912	58	.31	6.72	131	.17	4.06	5.17
1913	71	.31	7.11	128	.16	4.28	6.06
1914	77	.29	6.95	121	.17	4.50	6.01
Average 1910–1914	59	.31	7.12	132	.17	4.35	5.38
1915	72	.27	5.97	120	.22	5.38	5.62
1916	70	.30	7.59	122	.27	6.34	6.04
1917	77	.40	13.45	129	.47	10.50	7.53
1918	84	.47	15.37	125	.57	9.89	8.78
1919	89	.56	15.21	111	.46	8.21	8.91
1920	85	.59	12.59	112	.36	7.88	7.82
1921	67	.39	8.05	90	.16	4.57	5.25
1922	71	.36	8.54	87	.27	5.86	5.27
1923	72	.43	7.12	76	.39	6.40	5.22
1924	67	.40	7.29	64	.39	5.63	5.17

Compiled from data of Division of Crop and Livestock Estimates, Bureau of Agricultural Economics. The yearly price of milk cows and horses are simple averages of the monthly prices. The yearly prices for butter, hogs, sheep, wool, and beef cattle were obtained by weighting monthly prices according to the monthly movement of the respective commodities to market.

There was a general downward trend in the price of horses from 1910 to 1924, the average price being $148 per head in 1910 and $64 in 1924. The price of milk cows advanced nearly 80 per cent from 1910 to 1914; the price of the other commodities (sheep, wool, hogs, beef cattle, and butter) remained fairly stable during the five-year base period. During the war period the prices of butter, milk cows,

horses, and beef cattle remained at a very much lower level than did crop prices. While the price of hogs rose 116 per cent above the five-year base average, the prices of the grain crops used for hog feed rose to a much higher level. Sheep reached their peak price in 1917 and wool in 1918. Each then declined in price during the next four years. In 1923 the price of wool again rose to an attractive level and the prices of sheep and lambs advanced considerably in 1922 and 1923.

CHANGES IN PRODUCTION OF LIVESTOCK

The classes of livestock that have been of more or less importance in the development of the project are dairy and beef cattle, hogs, sheep, poultry, and horses. Poultry was not included in the livestock census taken by the Twin Falls Canal Co., and is omitted from this discussion for that reason. The number of animals of each class kept per 100 acres of crop and pasture land from 1914 to 1924 is shown in Figure 15. Prior to 1914 such information is not available.

Horses.—The number of work horses and mules kept per 100 acres of crop and pasture land increased from 2.6 head in 1914 to 5 head in 1924. This increase was doubtless due to an increase in the intensity of farming. The percentage of the crop and pasture land devoted to the row-tilled crops (potatoes, sugar beets, beans, and corn) increased during this period from 6.5 per cent in 1913 to nearly 35 per cent in 1924. The row-tilled crops, it is well known, require a much greater amount of horse labor than other crops. The combined number of mares, stallions, jacks, and colts, in contrast to the work horses, decreased from 3.4 head per 100 acres of land in 1914 to 0.9 head in 1924. This was owing to the decline in the value of horses. In other words, the raising of colts became very unprofitable.

Dairy cattle.—The number of dairy cattle per 100 acres of land slumped suddenly in 1917 and began to increase again about 1920. By 1922 the number had passed the previous high point reached in 1915. The price of milk cows and butter advanced slowly from 1915 to 1919, whereas crop prices increased rapidly during this time. As a result there was a decrease in dairy farming and a swing to crop farming. Dairying began to increase again when the prices of crops reached low levels.

Beef cattle.—Beef cattle (other cattle) was a very minor enterprise that about held its own during the 11 years covered by Figure 15. Among the beef cattle kept on the project are a number of purebred herds that are maintained primarily for the production of breeding stock. Although the price of beef cattle advanced less than 70 per cent during the period of inflation, as compared with the 1910–1914 average, the number kept per 100 acres of crop and pasture land remained fairly constant.

Hogs.—The number of hogs per 100 acres of land increased considerably in 1915, decreased slightly in 1916 and precipitously in 1917, reached the low ebb in 1921, and then made a substantial advance in 1922 and 1923. The highest price of hogs shown in Table 3 is $15.37 per 100 pounds in 1918. This is 115 per cent above the 1910–1914 average price. The increase in the price of the grain crops (wheat, barley, and corn), on which hogs are fattened in the Twin Falls district, on the other hand, was much greater. The high average price reached for barley and wheat during this time was

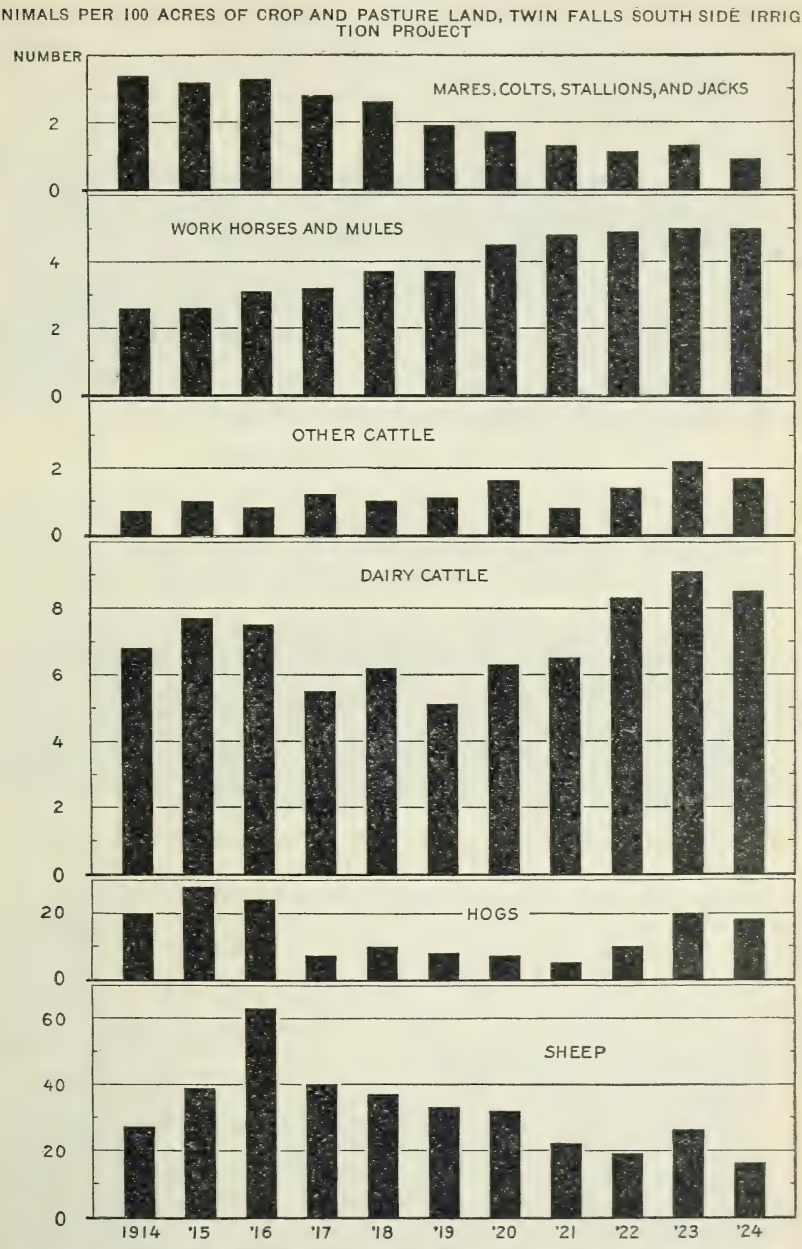

FIG. 15.—The number of each kind of animal kept per 100 acres of crop and pasture land during the years 1914 to 1924, inclusive, is indicated by the perpendicular bars and the figures opposite the respective classes of livestock. (Compiled from the annual reports of the Twin Falls Canal Co.)

147 and 195 per cent higher than the 1910–1914 average, respectively, for barley and wheat. Hence the slump in the hog enterprise in 1917.

Sheep.—A campaign conducted in southern Idaho from 1913 to 1916 to increase farm flocks of sheep is doubtless responsible for much of the increase in the number per 100 acres during 1915 and 1916. However, many farmers, inexperienced in the management of sheep, undertook the enterprise on too large a scale and were more or less unsuccessful. Because of this disadvantage and the exceptionally attractive prices of crops, there was a shift from sheep to cash-crop farming. Figure 15 shows a continuous decrease in sheep from 1916 to 1922, an increase in 1923, and a slight decrease again in 1924.

Sheep are excellent scavengers. They glean the fields after the crops are harvested, and much of the feed consumed is waste material. When the size of the flock is properly adjusted to the needs of the farm, sheep, under good management, are one of the most profitable enterprises for these irrigated farms. Figures 16, 17, and 18 illustrate some of the advantages of sheep in this district.

SUMMARY OF PROJECT DEVELOPMENT

In summarizing the development of the project attention is particularly directed to the following points:

1. From the beginning development has been rapid. It is now a little over 20 years since water was first turned into the irrigation ditches.

2. There was much to learn in the beginning. The settlers came from the North, South, East, and West, and many of them were inexperienced in irrigated farming. Little was known of the productive capacity of the soil under irrigation. The settlers, therefore, had to learn—very largely from experience—what crops and livestock could be produced and how to produce them. They had to learn, furthermore, what crops, livestock, and livestock products could be marketed to advantage.

3. So far as production is concerned, the 20 years of farm experience has shown that the project is well adapted to a very wide range of products. During this time the yields of practically all crops have been materially increased. Through competition, as shown in Figure 7, some crops have been almost eliminated, whereas others have greatly increased in importance. The changing prices of farm products, the changing of freight rates, the introduction and increase of crop and livestock pests, and the wide range of enterprises from which to choose are some of the factors that have made the selection of crop and livestock enterprises a very complicated problem.

BUSINESS ANALYSIS OF THE FARMS STUDIED

Because of the newness of the agriculture of the district, the wide range of crops adapted to the area, and the swing to cash-crop production during the four years immediately preceding the first year covered by this study (1919) very few farmers were found who had adopted definite crop rotations or cropping systems. In analyzing the business of the farms from which records were obtained, however, they were arranged in three groups or types: (1) General crop farms; (2) dairy and general crop farms; and (3) orchard and general crop farms.

FIG. 16.—When uncultivated or not pastured, ditch banks produce heavy growths of sweet clover and other weeds

FIG. 17.—When fenced and seeded to blue grass, ditch banks furnish excellent pasture for a small flock of sheep

FIG. 18.—When sheep are a prominent farm enterprise, it is usually necessary to keep them on permanent pasture during a part of the year

As in most good farming communities, some of the farms studied were operated by owners, some by men who owned part and rented part of the land they operated, and some by tenants. In the case of rented farms the capital, receipts, and expenses of the tenants and landlords were combined. The records were then used on the owner-farm basis.

GENERAL CROP FARMS

The general crop farms as here classified are those devoted largely to the production of the field crops common to the district studied and carrying little productive livestock. They varied in size from 17 to 345 acres in 1919 and from 20 to 240 acres in 1920, 1921, and 1922. The most frequent sizes are 40-acre, 80-acre, and 20-acre, respectively, in the order named. The smaller farms are generally located near the towns, and their value per acre was usually estimated a little higher than that of the larger farms.

UTILIZATION OF LAND

Table 4 shows the average size of the general crop farms and how the farm land was utilized during each of the four years of the study. During this period the average size of farm varied less than 3 acres, and the average acreage of tillable land, the crop land, and the land in pasture changed but little. These slight variations in the size of the farm are mainly due to the fact that a few farms were dropped each year and records from others were obtained to replace them. Table 4 also shows the average acreage devoted to the respective crops each year. The major crops are listed in the order of their importance when measured by acres per crop. The acreage devoted to the several crops varied considerably from year to year. These variations were far more striking on the individual farms and reflect the efforts of farmers to shift to the most profitable crops.

TABLE 4.—*Utilization of land on general crop farms 1919–1922*

Item	1919		1920		1921		1922	
Farms studied, number	190		178		169		67	
Size of farm	*Acres* 74.2		*Acres* 72.2		*Acres* 72.0		*Acres* 74.7	
Tillable land	67.4		66.0		66.3		69.2	
Crop area	63.0		61.7		61.4		63.5	
Idle crop land	.4		.3		.5		.0	
Crop land rented out	.0		.0		.5		2.0	
Pasture	4.0		4.0		3.9		3.7	
Pasture not tillable	2.0		1.1		1.0		.6	
Other land [1]	4.8		5.1		4.7		4.9	
Use of crop land:	*Acres*	*P. ct.*	*Acres*	*P. ct.*	*Acres*	*P. ct.*	*Acres*	*P. ct.*
Wheat	28.2	44.8	24.5	39.7	21.7	35.4	18.8	29.6
Alfalfa	12.9	20.5	15.9	25.8	15.3	24.9	12.6	19.8
Beans	7.0	11.1	5.0	8.1	3.6	5.9	10.8	17.0
Potatoes	2.5	4.0	2.7	4.4	4.6	7.5	8.0	12.6
Sugar beets	4.7	7.4	4.4	7.1	5.6	9.1	2.1	3.3
Red clover	1.9	3.0	2.4	3.9	5.4	8.8	6.1	9.6
Alsike clover	.5	.8	.7	1.1	1.1	1.8	1.2	1.9
Barley	1.8	2.8	2.8	4.5	1.3	2.1	.5	.8
Oats	.8	1.3	.7	1.1	.3	.5	.3	.5
Corn	.5	.8	.6	1.0	.7	1.1	1.3	2.0
Fruit and garden	1.9	3.0	1.7	2.8	1.6	2.6	1.5	2.4
Other crops	.3	.5	.3	.5	.2	.3	.3	.5

[1] Land occupied by roads, fences, buildings, corrals, canals, ditches, and land not used for pasture or crop production.

DISTRIBUTION OF LIVESTOCK

The number of productive livestock (measured in animal units) kept on the general crop farms was very scant. (Table 5.) During the four years of the study, there was an average of 12 to 13 animal units per farm. The work stock constituted a little more than one-third of all the livestock. Cattle, kept mainly to furnish the farm with butter, cream, and milk, made up almost another third. Although there was a slight increase in the cattle animal units each year, there were less than five per farm in 1922. Sheep were rarely found on the small farms. The number of hogs decreased in 1920 and 1921 and then increased in 1922. Few colts were raised in 1919 and the number decreased each year thereafter. The number of poultry remained about the same throughout the study.

TABLE 5.—*Distribution of livestock,*[1] *on general crop farms, 1919–1922*

Item	1919	1920	1921	1922
	Number	*Number*	*Number*	*Number*
Farms studied	190	178	169	67
Animal units per farm	12.2	12.8	12.5	12.8
Work stock	4.2	4.4	4.7	4.6
Productive stock	8.0	8.4	7.8	8.2
Cattle	3.8	3.9	4.5	4.9
Sheep	.5	1.8	1.3	1.2
Hogs	1.6	1.4	.7	1.1
Brood mares and colts	1.2	.5	.4	.2
Poultry	.9	.8	.9	.8

[1] In order to compare the livestock kept on the different farms, it is necessary to have a standard of comparison. The standard here used is the "Animal unit." It is represented by one mature horse, mule, cow, or steer. Also by as many smaller animals as require the feed of one of these mature animals. Usually 2 head of young cattle, 2 colts, 5 hogs, 10 pigs, 7 sheep, 14 lambs, or 100 chickens are considered equivalent to one animal unit.

DISTRIBUTION OF CAPITAL

Table 6 shows the average capital per farm for the period 1919–1922. The table also shows the average size of farm and the average value of real estate per acre. The values of real estate per acre are intended to represent sales values and are based on estimates of the farm operators. The average value of real estate per acre dropped from $373 in 1919 to $250 in 1922. Likewise, the average capital decreased approximately $10,000 during the same period. This is a decrease of about 32 per cent in each case. Though land values reached their highest peak during the first nine months of 1920, the depression was well under way before the close of the farm year, March 1, 1921. For the earning value of real estate from 1919 to 1922, see Table 9.

TABLE 6.—*Distribution of capital on general crop farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	190	178	169	67
Size of farms, acres	74.2	72.2	72.0	74.7
	Dollars	*Dollars*	*Dollars*	*Dollars*
Value of real estate per acre	373	367	262	250
Capital per farm	30,786	29,543	21,199	20,880
Real estate	27,657	26,465	18,828	18,681
Land	25,002	23,784	16,022	15,982
Dwelling	1,871	1,875	1,980	1,967
Other buildings	784	806	826	732
Working capital	3,129	3,078	2,371	2,199
Livestock	1,243	1,148	1,025	910
Machinery	761	875	779	699
Feed and supplies	456	583	196	214
Other working capital [1]	669	472	371	376

[1] Consists mostly of cash to run farm and borrowed capital on short loans.

Of the total average capital about 90 per cent was in real estate and 10 per cent in working capital. The value of buildings changed but little during the four years. Land, on the other hand, declined in value about $9,000 per farm or 36 per cent. The average value of working capital per farm was about 30 per cent less in 1922 than in 1919. Although the average value of machinery remained about the same during the four years, that of livestock, feed, and supplies and other working capital declined materially.

BUSINESS SUMMARY

Tables 7 and 8 present summaries of the business of the general crop farms for each of the four years of the study. In Table 7 the business is summarized in terms of output per farm, input per farm, and return to capital. Input in this case does not include the use of capital, one of the chief objects being to arrive at the approximate net return to the farm capital.

Output per farm.—Output per farm is subdivided into (1) cash output and (2) noncash output. Cash output consists of the amounts received from the sales of crops, livestock, and livestock products; also the cash received from other sources, such as labor performed away from the farm. The sales of crops during the four years of the study constituted an average of 83 per cent of the cash output, whereas the combined sales of livestock and livestock products constituted but 14 per cent. It will thus be seen that cash-crop farming strongly predominated in this group of farms. The total output per farm was greatest in 1919 and least in 1921.

Wheat was by far the most important crop grown during each of the four years of the study, when measured by the acreage devoted to each crop. There was a steady decrease in the acreage of this crop each year, however. (Table 4.) When measured by cash output the decline of wheat in importance was even more striking, the average cash sales in 1919 being $1,823 per farm and but $651 in 1922. That year (1922) wheat dropped to second place, while beans took first rank.

TABLE 7.—*Output per farm, input per farm, and return to capital on general crop farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	190	178	169	67
Size of farm, acres	74.2	72.2	72.0	74.7
	Dollars	*Dollars*	*Dollars*	*Dollars*
Output per farm—total	5,441	4,175	3,086	3,762
Cash output, total	4,929	3,759	2,716	3,426
Wheat	1,823	1,288	716	651
Potatoes	528	372	591	372
Beans	520	326	160	885
Sugar beets	480	657	316	326
Clover (hay and seed)	296	124	232	372
Alfalfa (hay and seed)	395	194	104	97
Other crops	174	105	121	56
Livestock	407	388	213	257
Livestock products	213	208	189	215
Other sources	93	97	74	195
Noncash output—total	512	416	370	336
Family-used perquisites [1]	353	416	370	336
Increase in inventories	159			
Input [2] per farm (other than of capital)—total	3,217	3,502	2,764	2,660
Cash input—total	2,219	2,134	1,721	1,559
Hired labor	441	352	241	210
Contract labor	141	176	196	141
Repairs	78	60	50	52
Feed bought	168	140	64	83
Automobile for farm use	145	116	134	107
Seed bought	108	172	96	105
Sacks and twine	74	89	71	118
Threshing and hulling	139	144	105	144
Taxes	312	326	418	331
Irrigation water	223	221	144	112
Livestock bought	304	206	91	75
Other sources	86	132	111	18
Noncash input—total	998	1,368	1,043	1,101
Decrease in inventories		134	182	218
Operator's labor	887	1,057	784	797
Unpaid family labor	111	177	77	86
Return to capital (output less input)	2,224	673	322	1,102
Return to capital, per cent	7.2	2.3	1.5	5.3

[1] "Family-used perquisites" as here used differs from "Family living from the farm" (U. S. Dept. Agr. Bul. 1338) in that here the proportional part of the perquisites used by the farm labor (both hired and family) was deducted from the total farm furnished perquisites.

[2] Input does not include the use of capital, the object being to arrive at the return to capital.

The average cash output of potatoes, beans, and sugar beets (the three leading row-tilled crops) was $466, $473, and $445, respectively, for the four-year period. The relative importance of these three crops, however, varied widely during the four years when judged either by the acreage devoted to each crop or by the cash output of each. These fluctuations, especially the variations in the acreage devoted to each crop from year to year, indicate the effort that farmers made to produce the most profitable crop.

Noncash output consists of two items: Family-used perquisites and increase in inventories (other than that of real estate). Perquisites consist of (1) the rent equivalent or use value of the farm dwelling, and (2) the value of the food products produced and consumed on the farm. Family-used perquisites equal the total perquisites less the proportional part used in boarding and housing the farm labor.

The farm labor, in this case, includes the hired labor that was boarded and the labor performed by members of the farm family (the operator included). Of the total farm perquisites, family-used perquisites constitute 63, 70, 59, and 66 per cent, respectively, in 1919, 1920, 1921, and 1922.

The principal items considered in computing the increase and decrease in inventories were work horses, milk cows, other breeding stock kept permanently on the farm, feed and supplies, machinery, and the farm buildings. If the combined value of these items at the close of the year was greater than at the beginning of the year, the difference represented an increase in inventories. If the value of these items was less at the end of the year than at the beginning, the difference represented a decrease in inventories. Increases and decreases in inventories were chiefly caused by purchases, sales, and deterioration in value due to the year's usage. In computing changes in the value of inventories an attempt was made to eliminate the influence of fluctuating prices except in the case of livestock produced.

Input per farm.—Input per farm is presented in Table 7 under two subdivisions: (1) cash input and (2) noncash input. Cash input averaged, during the four years of the study, approximately 63 per cent of the total input per farm. During these four years the average cash input decreased from $2,219 in 1919 to $1,559 in 1922. The principal items of cash input named in the order of their importance were: Labor, taxes, water, livestock bought, threshing and hulling, farm use of automobile, seed, and feed.

The noncash input consists of the decrease in inventories (other than that of real estate), the operator's labor and unpaid family labor. The method of arriving at the decrease in inventories was precisely the same as that used in determining the increase in inventories. There were decreases in inventories during each of the last three years of the survey. The estimate of the value of the operator's labor is intended to cover the expense that would have been incurred in hiring the services rendered by the operator in running the farm plus the cost of his board not furnished by the farm. The value of the unpaid family labor was estimated at going wages.

Return to capital.—Return to capital is output per farm less input (input other than of capital). When measured by this token, 1919 was by far the best year financially for these farmers, 1922 the second best, and 1921 the poorest. The average net return to capital per farm dropped from $2,224 in 1919 to $322 in 1921 and then increased to $1,102 in 1922. The percentage return to capital follows much the same trend as total return to capital. The average drop in the percentage return to capital, however, was much less proportionally than the total return to capital expressed in dollars. This, of course, is due to the fact that the average value of real estate decreased from $373 per acre in 1919 to $261 and $250, respectively, in 1921 and 1922. The variation in the financial returns of these farms during the four years, it is obvious, was due chiefly to changes in the prices received for the products sold. (Tables 2 and 10.)

TABLE 8.—*Receipts, expenses, and various incomes on general crop farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	190	178	169	67
	Dollars	*Dollars*	*Dollars*	*Dollars*
Receipts per farm	4,958	3,625	2,665	3,332
Expenses per farm	2,200	2,314	1,929	1,768
Farm income	2,758	1,311	736	1,564
Interest on capital at 7 per cent	2,155	2,068	1,484	1,462
Labor income	603	*−757	−748	102
Family income	2,869	1,488	813	1,650
Return to capital, per cent	6.1	0.9	−0.2	3.7

The terms used in Table 8 have the same general significance as usually found in published farm survey literature (see Farmers' Bulletin 1139). "Family-used perquisites" are included in output per farm in Table 7, while receipts in Table 8 do not include this item. For this reason Table 7 shows a higher percentage return to capital than Table 8. Output and input in Table 7 are greater, respectively, than receipts and expenses in Table 8. The returns from livestock are expressed in Table 7 in terms of cash sales of livestock and livestock products, cash purchases of livestock, and increased and decreased inventories, while in making up Table 8 a figure expressing the net return from livestock was used. Hence the difference between (1) output and receipts and (2) input and expenses in Tables 7 and 8.

The business of the general crop farms is further summarized in Table 8 in terms of receipts, expenses, and various incomes that the results of this survey may be more readily compared with the results of other surveys presented in these terms. Farm income (see also U. S. Department of Agriculture, Department Bulletin 1338, pp. 13, 14), it will be seen, is the average receipts less the average farm expenses. Labor income is farm income less 7 per cent interest on the average farm capital. Seven per cent was used in computing labor income, since the average farm mortgage rate for Twin Falls County in 1919 (as shown by the census report) was 7.2 per cent. Family income (computed on an owner-farm basis) is farm income plus the estimated value of the unpaid labor of members of the family other than the farm operator. Family income averaged $2,869 in 1919, $1,488 in 1920, $813 in 1921, and $1,650 in 1922.

If there were no interest and other debts to pay, family income (computed on an owner-farm basis) represents rather accurately the average plane upon which these farm families had to live during the period covered by the study. Family income represents approximately the average amount that was available per farm family with which to buy clothing and food, pay debts, make improvements, and meet the many personal expenses and obligations which come to every farm family. It should be remembered, however, that family income varied widely among the individual farms from year to year. The figures presented here are averages.

VALUE OF REAL ESTATE PER ACRE

Table 9 shows the approximate earning value of real estate per acre for each of the four years when the net return per acre is capitalized at some given percentage. The net return to the farm capital in Table 9 is carried forward from Table 7. Since capital consists of real estate and working capital, it is necessary to make a deduc-

tion for the use of the latter in order to estimate the earning value of real estate per acre. After allowing 8 per cent for the use of working capital each year there remained $26.60, $5.91, $1.83, and $12.40 per acre, respectively, for the use of real estate in 1919, 1920, 1921, and 1922.

The estimated earning values of real estate per acre, as shown in Table 9, equal these returns per acre capitalized at 4, 5, 6, and 7 per cent. If it is assumed that capital should earn 4 per cent, the average earning value of real estate per acre was $665 in 1919, $148 in 1920, $46 in 1921, and $310 in 1922. But if it is assumed that the capital should earn 7 per cent (approximately the average rate paid on mortgages in Twin Falls County in 1919), the average earning value of real estate per acre was $380, $84, $26, and $177, respectively, in 1919, 1920, 1921, and 1922.

TABLE 9.—*Approximate earning value of real estate per acre on general crop farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	190	178	169	67
	Dollars	*Dollars*	*Dollars*	*Dollars*
Net return to capital [1]	2,224	673	322	1,102
Use of working capital at 8 per cent	250	246	190	176
Net return to real estate	1,974	427	132	926
Net return per acre of real estate	26.60	5.91	1.83	12.40
Earning value of real estate per acre:				
Net return per acre capitalized at—				
Four per cent	665	148	46	310
Five per cent	532	118	37	248
Six per cent	443	98	30	207
Seven per cent	380	84	26	177

[1] Carried forward from Table 7.

A comparison of land values obtained by three methods for the year 1919 follows. This year is selected because it represents the peak year of prosperity before the slump in the prices of farm products. The average acre value of real estate when based on 59 actnal sales made in 1919 and 1920 was $375 (fig. 5), when based on the estimates of 190 farm operators $373 (Table 6), and when based on the assumption that the investment in real estate should earn 7 per cent, $380 (Table 9). This is a variation of but $7 per acre in the values obtained by the three methods. The significance of this appears below.

The chief factor governing the acre value of farm land, it is said, is yield or income. By yield is meant the present income per acre and the anticipated future incomes over a period of years. The foregoing discussion has shown that the average values of real estate in 1919 based (1) on the sales value, (2) on the estimates of 190 farm operators, and (3) on the net return per acre capitalized at 7 per cent were almost identical. It would appear, therefore, that the sales value and the estimated value of the 190 operators for 1919 were based entirely upon present income (the incomes of the most prosperous years of the boom period), or that future incomes (if considered at all) were looked upon with a great deal of optimism. Inability to anticipate and judge the future, it is now easy to see,

were the ruination of many who went into debt heavily for land at or near the crest of the period of high prices of farm products.

It is of interest to compare also the acre value of real estate for the years 1920, 1921, and 1922 (1) when based on the assumption that the investment should earn a definite rate of income—4, 5, 6, or 7 per cent and (2) when based on the estimates of the farm operators visited in obtaining the farm survey records. Table 9 shows that the estimated earning value of real estate dropped precipitously in 1920 and 1921 and then made a substantial recovery in 1922. Table 6 shows that the value of real estate based on the estimates of the farm operators dropped but little in 1920, considerably in 1921, and but little again in 1922. That is, the changes in the values based on the estimates of the farmers lagged far behind the changes in the computed earning values. That, of course, is as it should be.

The average percentage returned to the capital of the general crop farms (Table 7) varied from 7.2 in 1919 to 1.5 in 1921. In addition to the average yearly variation, there is also a wide variation in the percentage return each year to the capital of the individual farms (fig. 19).

VARIATION IN THE PERCENTAGE RETURN TO CAPITAL

A few farms each year made very high returns to capital. In 1921 when prices were lowest, 3 per cent of the farms made returns to capital of 12 per cent or more; in 1919, 1920, and 1922 a few made returns of 16 per cent or more. In contrast with these highly successful farms, others were just as unsuccessful. Four per cent of all farms in 1919, 30 per cent in 1920, 42 per cent in 1921, and 20 per cent in 1922 made minus returns to capital; that is, the input per farm (other than the use of capital) was greater than the output. The minus returns in some cases were as much as 11 per cent. The bulk of the farms, the figure shows, hovered about the average each year, approximately half of them being above and half below the average.

PRICES RECEIVED FOR CROPS

The prices received for the crops sold during the four years of this study perhaps had more influence on the financial success of these farms than any other single factor. Table 10 shows the average prices received for the principal crops grown from 1919 to 1922. The general slump in prices began in 1920. The minimum prices received were reached for some crops in 1921 and for other crops in 1922. The drop in prices, like the advance, was abrupt and uneven. That is, the prices of some crops dropped much more abruptly than the prices of others.

TABLE 10.—*Average prices received for designated crops on general crop farms, 1919–1922*

Year	Wheat, per bushel	Oats, per bushel	Barley, per bushel	Alfalfa hay, per short ton	Sugar beets, per short ton	Potatoes, per 100 pounds	Beans, per pound	Red clover seed, per pound	Alsike clover seed, per pound
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Cents*	*Cents*	*Cents*
1919	1.85	0.96	1.36	17.79	11.00	1.78	7.0	45.5	39.5
1920	1.46	.71	.71	7.35	12.00	1.01	5.9	11.9	22.9
1921	.81	.55	.59	4.64	6.00	1.05	4.1	15.0	15.3
1922	.83	.53	.46	6.88	8.39	.44	4.3	16.2	12.9

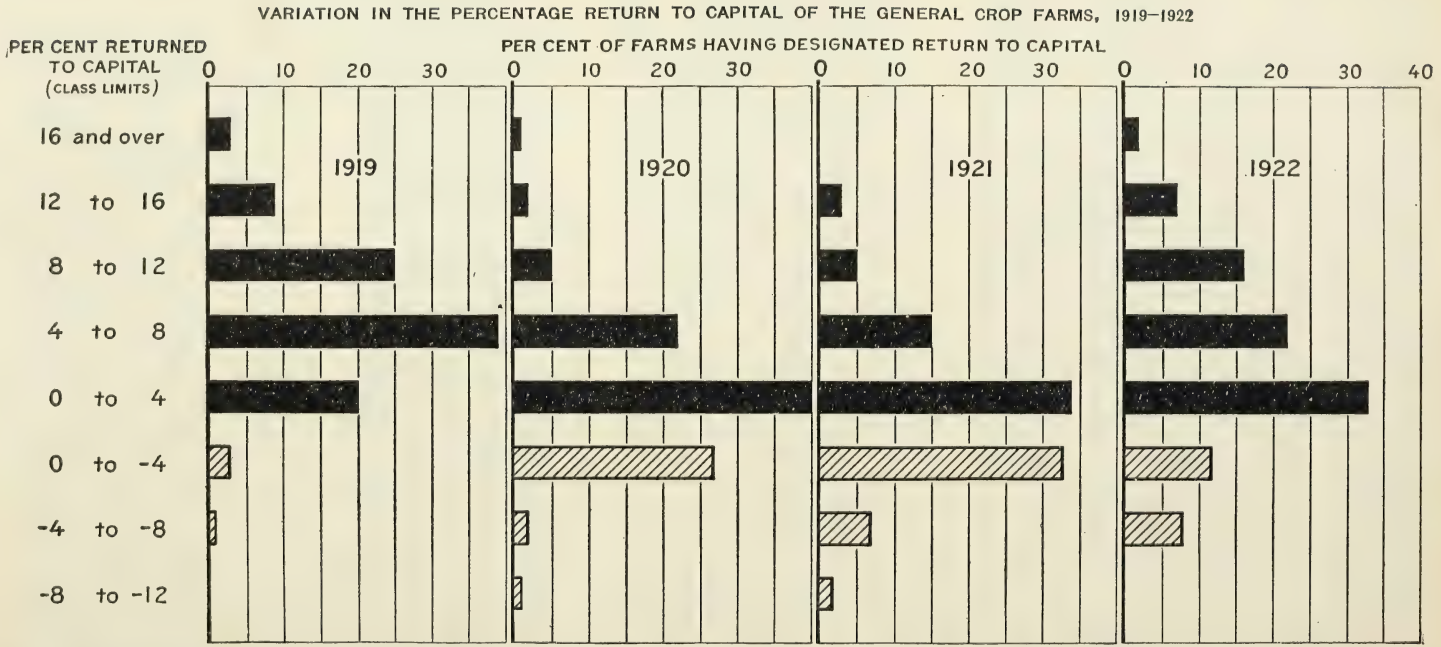

FIG. 19.—Each year a few farms made high returns while a few others made very low returns. In general the return to capital was highest in 1919 and lowest in 1921. During 1920 and 1921 prices of most farm products dropped precipitously and then rose slightly in 1922. The average value of the farm capital on which the percentage return to capital was computed dropped but little in 1920, considerably in 1921, and then remained about stationary in 1922

The rapid and unequal advance in prices just prior to the beginning of the study in 1919 had greatly disturbed the agricultural equilibrium of the district. At planting time farmers were at a loss to know which would be the best money-making crops at the end of harvest. The abrupt and disproportional slump in prices during 1920 and 1921 added much to the confusion. As a result there was considerable shifting in the acreage devoted to the respective crops (fig. 7 and Table 4) and in the average return to capital in 1920 and 1921.

CROP YIELDS

Where so high a percentage of the total output per farm comes from the sale of crops (an average of 83 per cent) as was the case with these general crop farms, the question naturally arises as to what is the relation between the average yield of all crops per farm and the percentage return to the farm capital. Figure 20 is designed to show this relation.

Relation of crop yield to return to capital.—The farms are arranged in Figure 20 in four groups according to the average crop yields of the individual farms, namely, less than 86 per cent, 86 to 99 per cent, 100 to 113 per cent, and over 113 per cent of the average. Without exception the group average percentage return to capital increased each year as the average yield increased. The average return to the capital of the group of farms having the lowest yields (less than 86 per cent of the average) was 3.9 per cent, 0.2 per cent, −1, and 2.5 per cent, respectively, in 1919, 1920, 1921, and 1922. In contrast with this, the return to the capital of the group of farms having the highest yields (over 113 per cent of the average), was 9.5 per cent in 1919, 4.9 per cent in 1920, 4 per cent in 1921, and 6.2 per cent in 1922. The average percentage returned to the capital of the group with low yields for the four years was 1.4 per cent while that of the group with high yields was 6.2 per cent. This difference gave the group with high yields approximately $950 more net return per farm than was received by the farmers in the group with low yields. The importance of high yields to the individual farmer is therefore very evident. Especially is this true in districts like the one under consideration where high yields are not obtained by the use of commercial fertilizers; that is, where it costs but little more to obtain high yields than low yields.

TABLE 11.—*Average crop yields per acre on general crop farms, 1919–1922*

Year	Wheat	Corn	Barley	Oats	Alfalfa hay	Sugar beets	Potatoes	Beans	Red clover		Alsike clover seed
									Hay	Seed	
	Bush.	*Bush.*	*Bush.*	*Bush.*	*Short tons*	*Short tons*	*100 lbs.*	*Lbs.*	*Short tons*	*Lbs.*	*Lbs.*
1919	38	47	40	45	4.0	9.09	136	1,125	1.1	285	291
1920	40	45	39	46	4.1	12.43	162	1,209	1.0	250	428
1921	46	43	40	49	4.1	9.51	149	1,151	1.3	220	331
1922	47	59	53	56	4.1	17.75	185	1,953	1.1	325	245
Av.	43	48	43	49	4.1	12.20	158	1,360	1.1	270	324

Average yields.—A knowledge of average yields is of value in that it furnishes standards by which the yields obtained on each farm may be readily judged. With this end in view the average yields of 10 crops are presented in Table 11. These yields are based on harvested acres and those for alfalfa represent three cuttings of hay. One cutting of hay and a seed crop are generally obtained from red clover, but alsike clover is grown entirely for the seed crop. The average yields of some crops varied but little during the four years, while those of other crops varied considerably. The maximum variations in the yields of alfalfa, wheat, and oats were 10, 13, and 14 per cent,

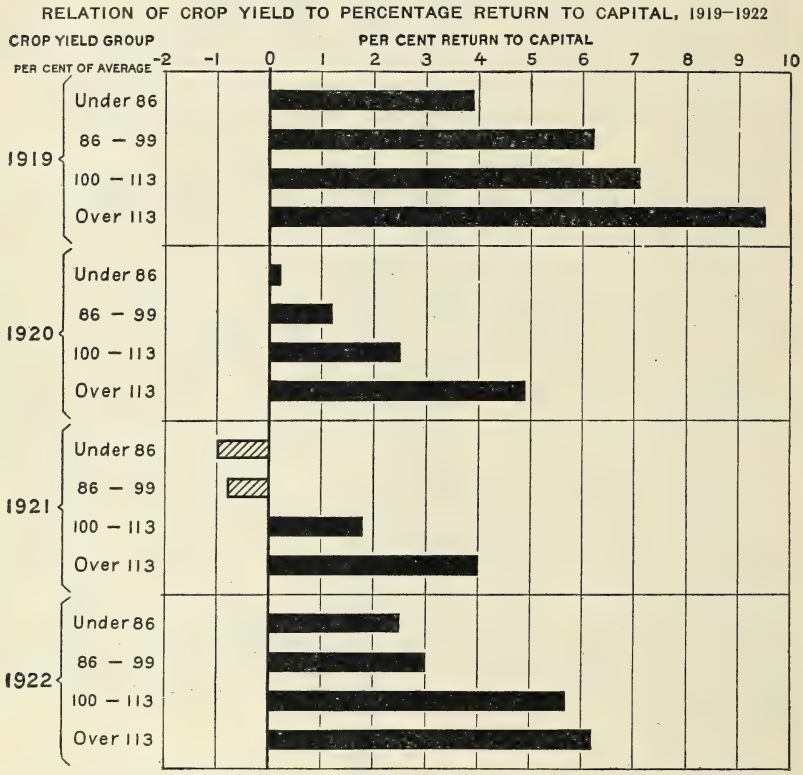

FIG. 20.—The crop yield groups presented in this figure are based on crop index (per cent of average yields). The average percentage return to capital of the respective farms having different crop yields is indicated by the heavy horizontal bars and the figures at the top of the chart. Without exception the percentage return to capital increased, though not in the same proportion, as crop yield increased.

respectively, from the 1919–1922 average. The maximum variation in the yield of sugar beets, on the other hand, was 46 per cent, that of beans 42 per cent, and that of alsike clover seed 32 per cent.

From the standpoint of producing feed, a comparison of the average yields of the four cereal crops is of interest. Expressed in hundredweights per acre to the nearest whole number the 1919–1922 average yields are as follows: Corn 27, wheat 26, barley 21, and oats 16. That is, the average yield of corn during the four years of the survey has been about 100 pounds, 600 pounds, and 1,100 pounds greater, respectively, than the yields of wheat, barley, and oats.

Variation in crop yields.—Figure 20 shows the importance of obtaining high crop yields. Tables 12 to 17, inclusive, are presented to show the variation in the yields of each of the seven crops. Wheat varied in yield from less than 15 bushels to as much as 93 bushels per acre; potatoes from 50 hundredweight to 300 hundredweight; beans from 106 pounds to 3,000 pounds; sugar beets from 1.5 tons to 22.5 tons; red clover seed from 55 pounds to 720 pounds; and alfalfa hay from 2 tons to 7.5 tons.

TABLE 12.—*Variation in yield of wheat on general crop farms, 1919–1922*

Acre yield class limits	Number of records			
	1919	1920	1921	1922
Bushels				
85 to 94		1	1	
75 to 84		0	0	
65 to 74		4	6	3
55 to 64	4	8	21	16
45 to 54	43	37	71	26
35 to 44	79	77	48	15
25 to 34	52	50	20	5
15 to 24	7	6	4	1
5 to 14	2	1	1	
Total	187	184	172	66

TABLE 13.—*Variation in yield of alfalfa hay on general crop farms, 1919–1922 (three cuttings)*

Yield per acre class limits	Number of records			
	1919	1920	1921	1922
Short tons				
7.5 to 8.4			1	
6.5 to 7.4	6	3	1	
5.5 to 6.4	12	15	6	5
4.5 to 5.4	50	45	52	24
3.5 to 4.4	68	62	76	38
2.5 to 3.4	28	30	28	13
1.5 to 2.4	12	5	3	4
Total	176	160	167	84

TABLE 14.—*Variation in yield of potatoes on general crop farms, 1919–1922*

Yield per acre class limits	Number of records			
	1919	1920	1921	1922
Hundredweight				
300 to 349				1
250 to 299	2	7	4	4
200 to 249	9	18	13	13
150 to 199	17	14	29	15
100 to 149	33	27	37	7
50 to 99	12	15	14	3
Under 50	3	5	4	
Total	76	86	101	43

The foregoing table contains no fields of potatoes of less than 1 acre.

TABLE 15.—*Variation in yield of sugar beets on general crop farms, 1919–1922*

Yield per acre class limits	Number of records			
	1919	1920	1921	1922
Short tons				
21 to 23		4		1
18 to 20		2		2
15 to 17	5	7	2	2
12 to 14	12	19	12	3
9 to 11	13	23	18	1
6 to 8	20	15	23	1
3 to 5	10	6	7	
Under 3		1	7	
Total	60	77	69	10

TABLE 16.—*Variation in yield of beans on general crop farms, 1919–1922*

Yield per acre class limits	Number of records			
	1919	1920	1921	1922
Pounds				
3,000 to 3,599				1
2,400 to 2,999			1	5
1,800 to 2,399	6	3	5	18
1,200 to 1,799	22	27	23	20
600 to 1,199	35	26	12	3
Under 600	7	7	12	
Total	70	63	53	47

TABLE 17.—*Variation in yield of red clover seed on general crop farms, 1919–1922*

Yield per acre class limits	Number of records			
	1919	1920	1921	1922
Pounds				
700 to 799	1			
600 to 699	1			
500 to 599	2		1	1
400 to 499	2	3	5	6
300 to 399	9	10	13	10
200 to 299	13	15	23	7
100 to 199	6	11	27	6
Under 100	3	3	5	1
Total	37	42	74	31

SOME FACTORS THAT INFLUENCE CROP YIELDS

Figure 20 shows the effect of high and low crop yields on the percentage return to capital, and Tables 12 to 17 make it clear that crop yields may be materially increased on many of these farms. Table 18 is designed to illustrate concretely how the yield of irrigated field crops may be affected (1) by the rotation of crops, (2) by the application of barnyard manure, and (3) by the introduction of a leguminous crop into the rotation.

The data presented in Table 18 are based on the results obtained from carefully planned experiments conducted at the Scottsbluff Experiment Farm, Mitchell, Nebr., from 1912 to 1923. It is believed that the averages for the last seven years (1917–1923) will more accurately measure the influence of these three factors on crop yields than averages for the 12-year period. The conclusion should not be drawn that precisely the same results would be obtained were these experiments duplicated in other irrigated districts. It is believed, however, that very similar results would be obtained in Twin Falls County, for the soils of the two districts are very similar. The virgin soils of both districts were well supplied with the essential mineral elements of plant food and both were low in organic matter and available nitrogen.

TABLE 18.—*Effect of rotation of crops, barnyard manure, and alfalfa on yield of irrigated crops at Scottsbluff Experiment Farm, Mitchell, Nebr., 1917–1923*

Rotation number	Rotations (Sequence of crops)	Seven-year average yield per acre 1917–1923					
		Wheat	Corn	Alfalfa hay	Potatoes	Oats	Sugar beets
	Continuous production of each crop on the same land	*Bush.* 13	*Bush.* 30	*Short tons* 4.9	*Bush.* 59	*Bush.* 40	*Short tons* 8.1
18	Wheat–sugar beets	22					8.9
28	Wheat–oats	16				37	
48	Wheat–oats–alfalfa–alfalfa	25		2.3		62	
16	Corn–oats		32			45	
32	Corn–oats–sugar beets		36			46	9.8
62	Corn–oats–beets–alfalfa–alfalfa–alfalfa		58	3.4		65	14.6
22	Oats–sugar beets					52	10.0
23	Oats–sugar beets (manure)					64	18.2
42	Oats–sugar beets–alfalfa–alfalfa			2.2		65	16.7
20	Potatoes–sugar beets				111		10.7
21	Potatoes–sugar beets (manure)				159		16.8
40	Potatoes–sugar beets–alfalfa–alfalfa			2.2	246		17.9
26	Potatoes–corn		33		104		
24	Potatoes–oats				123	48	
27	Potatoes–oats (rye plowed under)				162	59	
25	Potatoes–oats (manured)				190	62	
44	Potatoes–oats–alfalfa–alfalfa			2.6	226	65	
30	Potatoes–oats–sugar beets				137	57	9.8
31	Potatoes–oats–sugar beets (manure)				189	74	16.8
60	Potatoes–oats–beets–alfalfa–alfalfa			3.3	226	68	14.8
61	Potatoes–oats–beets (manure)-alfalfa-alfalfa-alfalfa			3.3	288	73	19.1

Compiled from the 1923 annual report of James A. Holden, Superintendent of the Scottsbluff Experiment Farm, which is supported cooperatively by the Nebraska Agricultural Experiment Station, and the Office of Western Irrigation Agriculture, Bureau of Plant Industry, United States Department of Agriculture. Those interested in a further study of these rotations should read Nebraska Experiment Station Bulletin 190 and United States Department of Agriculture Circulars 173 and 289.

Table 18 shows seven-year average yields of crops grown (1) continuously on the same land and (2) in the respective rotations. Three of the 2-year and one each of the 3-year and 6-year rotations received manure once in the rotation period at the rate of 12 tons per acre. The manure was applied to the beet plat (after the beets were harvested) of rotation 21 and to the oat stubble of rotations 23, 25, 31, and 61. Rye was sown in the oat stubble of rotation 27 and plowed under as green manure the following spring.

Effect of rotating crops on crop yields.—Table 18 shows a higher yield for alfalfa when grown on the same land year after year than when grown in rotation with other crops. When grown continuously on the same land the yield was about twice as great as when the

alfalfa occupied the land two years in a 4-year rotation and about one and one-half times as great as when the alfalfa occupied the land three years in a 6-year rotation. The alfalfa in these rotations is seeded alone in the spring. Troublesome weeds make it necessary to clip the young alfalfa two or three times and as a consequence little or no hay is made the first year. This materially reduces the average yield for the rotation period. The yield of oats was also about 3 bushels less per acre when grown in a 2-year rotation with wheat than when grown continuously on the same land.

The yield of wheat, corn, potatoes, sugar beets, and oats was increased in each case, except as noted above, by the rotation of crops when compared with the yield of each crop grown continuously on the same land. The increase in the yield of each crop was striking in each case, where alfalfa had a place in the rotation (rotations 40, 42, 44, 48, 60, and 62). The increase was not very great, on the other hand, in the rotations not containing alfalfa (rotations 16, 18, 20, 22, 24, 26, 28, and 30) with the exception of potatoes. In all cases the rotation of crops materially increased the yield of this crop.

Table 18 also shows that there is considerable variation in the influence that the respective crops have on the yield of other crops in the rotation with which they are grown. For example the average yields of sugar beets when grown in 2-year rotations were 8.9 tons per acre when grown with wheat, 10 tons per acre when grown with oats, and 10.7 tons per acre when grown with potatoes. The yields of oats were 37, 45, 48, and 52 bushels per acre, respectively, when grown in 2-year rotations with wheat, corn, potatoes, and beets. The yields of potatoes grown in 2-year rotations were 104 bushels per acre after corn, 111 bushels after sugar beets, and 123 bushels after oats. A study of the yields of the crops grown in the alfalfa rotations indicates that potatoes are by far the best crop to plant on alfalfa sod when measured by the increase in the yield obtained.

Effect of adding alfalfa to the rotation on crop yields.—A comparison of the yields obtained from (1) rotations 28 and 48, (2) rotations 22 and 42, (3) rotations 20 and 40, (4) rotations 24 and 44, (5) rotations 32 and 62, and (6) rotations 30 and 60 show the effect on crop yields of adding alfalfa to the rotation. The addition of two years of alfalfa (1) to rotation 28 increased the yield of wheat 9 bushels per acre and that of oats 25 bushels; (2) to rotation 22 increased the yield of oats 13 bushels per acre and that of sugar beets 6.7 tons; (3) to rotation 20 increased the yield of potatoes 135 bushels per acre, and that of sugar beets 7.2 tons; and (4) to rotation 24 increased the yield of potatoes 103 bushels per acre, and that of oats 17 bushels. Likewise the addition of three years of alfalfa (1) to rotation 32 increased the yield of corn 22 bushels per acre, that of oats 19 bushels, and that of sugar beets 4.8 tons; and (2) to rotation 30 increased the yield of potatoes 125 bushels per acre, that of oats 11 bushels, and that of sugar beets 5 tons.

Effect of barnyard manure on crop yields.—A comparison of the yields obtained from (1) rotations 22 and 23, (2) rotations 20 and 21, (3) rotations 24 and 25, and (4) rotations 30 and 31 shows the effect of the manure applied in these experiments on the yields of the crops in the respective rotations. The application of 12 tons of manure per acre once in the rotation period (1) to rotation 23 increased the average yield of oats 12 bushels per acre and that of sugar beets

8.2 tons; (2) to rotation 21 increased the yield of potatoes 48 bushels per acre and that of sugar beets 6.1 tons per acre; (3) to rotation 25 increased the average yield of potatoes 67 bushels per acre, that of oats 14 bushels; and (4) to rotation 31 increased the average yield of potatoes 52 bushels per acre, that of oats 17 bushels, and that of sugar beets 7 tons.

Combined effect of rotation of crops, alfalfa, and manure on crop yields.—The combined influence of rotating crops, adding alfalfa to the rotation, and the application of 12 tons of manure per acre once in the rotation period is indicated by a comparison of the yields obtained when the respective crops were grown continuously on the same land with the yields obtained in rotation 61. This comparison shows these three factors increased the yield of potatoes 229 bushels per acre, that of oats 33 bushels, and that of sugar beets 11 tons. That is, these three factors increased the yield of potatoes 388 per cent, that of oats 82 per cent, and that of sugar beets 136 per cent.

Effect of manure on the yield of sugar beets in the district studied.—Table 19 is presented to show that high yields (at least of sugar beets) can be obtained in the district studied by a liberal use of barnyard manure. This table shows the yields of sugar beets grown on four well-manured tracts of land located near the sugar factory at Twin Falls, Idaho. The footnotes following the table show the quantities of manure applied.

The following points deserve attention: (1) That beets were grown continuously on the 10-acre tract for eight years, on the two 6-acre tracts for six and seven years, and on the 20-acre tract for six years; (2) that the lowest yield obtained during these years was 14 tons per acre; and (3) that the average yields of the four tracts ranged from 17 to 20 tons per acre. For the four years of the survey (1919–1922) the average yield of these four tracts of beets was 18.8 tons per acre; for the same period, the average yield of beets on all of the farms studied was 12.2 tons per acre. Probably not all of this difference should be credited to the influence of the manure applied, for the men who grew these four tracts of beets were far more skilled in the art of sugar-beet culture than most beet growers and there may have been some difference in the grade of land used.

TABLE 19.—*Yield in short tons per acre of sugar beets grown continuously on heavily manured land, near the sugar factory, Twin Falls, Idaho*

Year	10 acres [1]	6 acres [2]	6 acres [3]	20 acres [4]
1916	14			
1917	15		16.5	
1918	18	20	22	14
1919	20	21	18	20
1920	14	16	22	15
1921	17	19.5	16	16.5
1922	21	21	22.5	21
1923	20	24	26	22
Average	17.4	20.2	20.4	18.1

[1] Manure applied at the rate of 15 tons per acre each year except two years when only 5 tons per acre were applied.
[2] Manure applied at the rate of 15 tons per acre.
[3] Manure applied at the rate of 12 loads (90 bushels per load) per acre each year.
[4] Manure applied at the rate of 10 tons per acre.

The tons of manure applied in each case were estimated, and the water content of the manure doubtless varied widely. For these reasons, no close comparison can be made as to the quantities of plant food that were applied to these four tracts of land.

Good seed.—Crop yields are frequently affected materially by the quality of the seed planted. Especially is this true with certain crops like potatoes and beans where the seed may carry diseases over from one crop to the next. The significance of this point is illustrated well by a record of a tenant farm obtained in this study. Eight acres of potatoes were grown. Under the agreement the tenant and landlord each were to furnish one-half the seed and receive one-half the crop. The tenant received the crop produced on 4 acres planted with the seed he furnished and the landlord, the crop from the other 4 acres planted with his seed. The tenant's total crop was 300 hundredweight. Of this amount two-thirds rotted because of its diseased condition and one-third was sold at 80 cents per hundredweight. The landlord's total crop was 600 hundredweight, all of which sold at $1 per hundredweight. Hence, it is evident that the use of poor seed may reduce the yield, the price received per unit, and the percentage of the crop that is marketable.

Well-timed performance of cultural operations.—Like men in all other lines of business, some farmers are good managers and others are not. Some are able to look ahead, plan their work, and then perform the various operations at or near the optimum time, that is, when each operation will accomplish approximately the maximum good. The results are fields that are reasonably free from weeds, thrifty growing crops, and high yields produced at low costs. Other farmers, on the other hand, are a day, a week, or two weeks behind with their work. The consequences are hampered crops and diminished yields produced at high costs. There is a best time, each season, for performing each cultural operation and a best way or method, and the farm operator—consciously or unconsciously—must decide both as to the time and the method.

The importance of the well-timed performance of the cultural operations is strikingly shown by the results of two Nebraska experiments conducted to show the effect of delaying the dates of planting and thinning sugar beets grown under irrigation:

> An average of three-years' tests shows that 20 days of delayed thinning reduced the yield more than five tons per acre. . . . Where the beets were planted four weeks after the land was prepared the yield was 3.73 tons per acre less than where the planting was made the next day after the land was prepared.[1]

In summarizing it may be said that this discussion indicates something of the complexity of the problem of making the best use of the factors which make for high crop yield and which are largely under the farmer's control. Farm experience of the past 20 years leads unerringly to the conclusion that the rotation of crops, the application of barnyard manure, the growing of legumes (alfalfa, the clovers, and beans) in the rotation, the use of good seed, and the well-timed performance of the cultural operations are all important factors in the district studied. Because of the absence of experimental data that apply specifically to this district, the results of the Nebraska experiment are presented to assist the farm operator in properly evaluating these factors.

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[1] HOLDEN, J. A. WORK OF THE SCOTTSBLUFF EXPERIMENT FARM, NEBR., IN 1920 AND 1921. U. S. Dept. Agr. Cir. 289, pp. 14. 1924.

VARIATION IN VALUE OF FARM-FURNISHED FOOD PER ADULT PERSON

Family-used perquisites during the four years of the study constituted about 9 per cent of the total ouput of the general crop farms. These perquisites are made up of the various food items and shelter. They are items of return from the farm that are often little appreciated and their values vary widely from farm to farm.

It is not easy for farmers to increase materially the value of the shelter (the use of the dwelling) furnished by the farm. Usually that would mean the erection of better dwellings which would require considerable capital. The quantity of food furnished per adult person, on the other hand, may be much or little as the farm operator chooses. For this reason the following discussion is confined to the food furnished by the farm for the use of the family, the shelter being omitted (fig. 21).

VARIATION IN THE VALUE OF THE FARM FURNISHED FOOD PER ADULT PERSON ON 207 FARMS, 1919

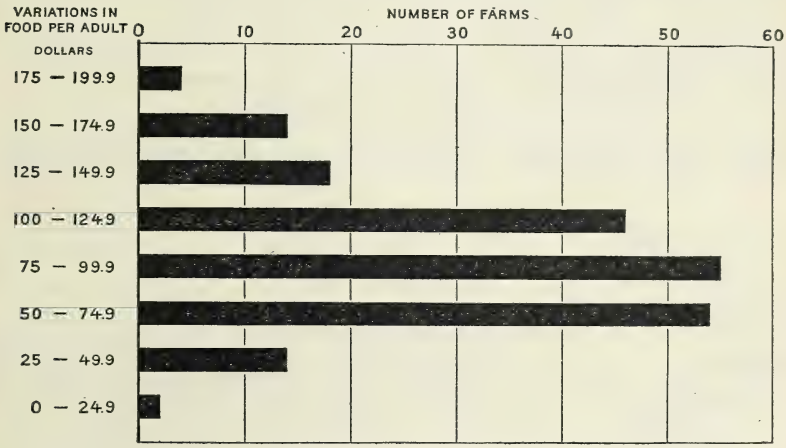

FIG. 21.—In computing the number of adult persons per farm, persons under 16 years of age were considered as equal to two-thirds of an adult and those 16 or over as adults. The numbers in the upper part of the chart and the bars indicate the number of farms that furnished the designated values of food per adult person. A few farms furnished very little home-grown food per adult person, while the amount furnished by a few others was high. The average amount for 207 farms was about $94 per adult

Of the total value of the farm-furnished food, dairy products were 40 per cent, meats 21 per cent, garden products and potatoes 18 per cent, eggs 13 per cent, and fruits 8 per cent. The value of the farm food furnished per adult person averaged $94, and ranged in value from less than $15 to as much as $195. This wide variation would seem to indicate that the production of home-grown food may be profitably increased on many of these farms. It is usually cheaper to raise it than to buy it. If it is not produced on the farm, the family frequently does without it. It is by giving special attention to the production of home-grown foods that some farmers are able to tide over periods of depression successfully when the prices of farm products are ruinously low.

EFFECT OF SIZE ON ORGANIZATION AND OPERATION OF FARMS

Where the output is derived almost entirely from the sale of crops, the size of farm materially influences the effectiveness with which capital and labor can be used in the organization and operation of farms. The following discussion of this subject is confined to two size groups, 40-acre and 80-acre farms, because of the frequency with which these two sizes occur in this district, and it is assumed that the operators of the 40-acre farms are equally capable of managing 80-acre farms.

Utilization of land.—The utilization of the farm land of these two size groups is shown in Table 20. The proportional parts of the total of these farms that was tillable land or in crops differed so slightly in the two groups that it can not be said that one group had the advantage of the other in this respect. They did differ considerably, however, in the percentage of the total crop acreage that was devoted to the respective crops. During the four years the 80-acre farms devoted an average of 7 per cent more of the crop area to wheat and 6 per cent less to sugar beets than did the 40-acre farms. Although the percentages of the crop area that were devoted to the other crops varied considerably from year to year, the averages for the two groups for the four years are very close together.

TABLE 20.—*Utilization of land on 40-acre and 80-acre farms, 1919–1922*

Item	40-acre farms				80-acre farms			
	1919	1920	1921	1922	1919	1920	1921	1922
Farms studied, number	51	53	52	14	38	37	33	16
Size of farms	*Acres* 40.2	*Acres* 40.3	*Acres* 40.0	*Acres* 40.0	*Acres* 80.0	*Acres* 79.9	*Acres* 79.8	*Acres* 79.5
Tillable land	36.8	37.1	36.6	36.8	74.5	72.6	74.3	72.4
Crop acreage	34.4	35.1	35.2	35.2	70.4	69.2	70.7	69.1
Idle crop land	.1	.1	------	------	.5	------	.2	------
Pasture	2.3	1.9	1.4	1.6	3.6	3.4	3.4	3.3
Pasture not tillable	.6	.4	.2	.4	1.6	1.6	.9	1.3
Other land [1]	2.8	2.8	3.2	2.8	3.9	5.7	4.6	5.8
Crop acreage in:	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Wheat	43	34	34	22	50	43	40	28
Alfalfa	19	22	22	20	20	26	21	20
Beans	10	8	5	26	14	9	8	21
Potatoes	6	5	8	10	4	5	8	12
Sugar beets	7	12	13	5	4	4	4	------
Clover	6	9	11	8	3	6	14	14
Fruit and garden	4	3	3	4	2	2	2	2
Other crops	5	7	4	5	3	5	3	3

[1] Land occupied by roads, fences, buildings, corrals, canals, and ditches. That is, all land not used for pasture or crop production.

Distribution of livestock.—The kinds of livestock kept on the 40-acre and 80-acre farms and the number of animal units of each kind are shown in Table 21. In proportion to size of farm, the 40-acre farms kept more of each class of livestock (except sheep) than did the 80-acre farms. The 40-acre farms kept an average of 8.8 animal units per farm and the 80-acre farms 11.4 units. Of these numbers 3.5 were work animals and 5.3 were productive animals on the 40-acre farms, whereas 4.6 were work animals and 6.8 were productive

animals on the 80-acre farms. Aside from the work animals, the livestock on these farms was kept largely to supply the needs of the farm family. This made it necessary for the 40-acre farms to keep more productive livestock in proportion to size of farm than was kept by the 80-acre group.

TABLE 21.—*Distribution of livestock on 40-acre and 80-acre farms,*[1] *1919–1922*

Item	40-acre farms				80-acre farms			
	1919	1920	1921	1922	1919	1920	1921	1922
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Farms studied	51	53	52	14	38	37	33	16
Animal units per farm	8.2	8.6	8.5	10.0	12.0	10.8	11.3	11.6
Work stock	3.1	3.6	3.4	4.0	4.8	4.4	4.9	4.4
Productive stock	5.1	5.0	5.1	6.0	7.2	6.4	6.4	7.2
Cattle	2.8	3.3	3.6	3.8	3.6	3.8	4.1	4.7
Sheep	.3	.1			1.3	.5	.2	
Hogs	.8	.6	.4	1.2	.8	.9	.8	1.2
Mares and colts	.3	.2	.2	.2	.5	.4	.2	.2
Poultry	.9	.8	.9	.8	1.0	.8	1.1	1.1

[1] In order to compare the livestock kept on the 40 and 80 acre farms, it is necessary to have a standard unit of comparison. The standard used is the "Animal unit." It consists of a mature horse, mule, cow, or steer. Also as many smaller animals as require the feed of one of these mature animals. Usually 2 head of young cattle, 2 colts, 5 hogs, 10 pigs, 7 sheep, 14 lambs, or 100 chickens are considered equivalent to one animal unit.

TABLE 22.—*Distribution of capital on 40-acre and 80-acre farms, 1919–1922*

Item	40-acre farms				80-acre farms			
	1919	1920	1921	1922	1919	1920	1921	1922
Farms studied, number	51	53	52	14	38	37	33	16
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value of real estate per acre	414	398	285	269	395	364	258	243
Capital	18,600	18,020	12,902	12,277	34,773	32,148	23,104	21,487
Real estate	16,652	16,027	11,389	10,750	31,595	29,127	20,615	19,313
Land	14,523	13,885	9,200	8,767	28,965	26,427	17,677	16,380
Dwelling	1,604	1,581	1,668	1,606	2,007	1,977	2,137	2,187
Other buildings	525	561	521	377	623	723	801	746
Working capital	1,948	1,993	1,513	1,527	3,178	3,021	2,489	2,174
Livestock	770	739	642	644	1,196	1,109	992	925
Machinery	517	624	512	516	819	905	863	698
Feed and supplies	303	386	137	121	413	553	198	201
Other	358	244	222	246	750	454	436	350
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Capital	100	100	100	100	100	100	100	100
Real estate	89.5	88.9	88.3	87.6	90.9	90.6	89.2	89.9
Land	78.1	77.0	71.3	71.4	83.3	82.2	76.5	76.2
Dwelling	8.6	8.8	12.9	13.1	5.8	6.2	9.2	10.2
Other buildings	2.8	3.1	4.1	3.1	1.8	2.2	3.5	3.5
Working capital	10.5	11.1	11.7	12.4	9.1	9.4	10.8	10.1
Livestock	4.2	4.1	5.0	5.2	3.4	3.5	4.3	4.3
Machinery	2.8	3.5	4.0	4.2	2.3	2.8	3.7	3.3
Feeds and supplies	1.6	2.1	1.0	1.0	1.2	1.7	.9	.9
Other	1.9	1.4	1.7	2.0	2.2	1.4	1.9	1.6

Distribution of capital.—The distribution of the capital of the two size groups of farms into land, buildings, machinery, feed and supplies, and other working capital is shown in Table 22. The chief point to be observed in this comparison is the proportion of the capital required for equipment. During the four-year period the 40-acre farms had averages of 3.5 per cent and 1.6 per cent more of the total capital tied up in buildings and working capital, respectively, than had the 80-acre farms. In other words a greater proportion of the capital of the 80-acre farms was in land that could be used for producing crops.

Net return to capital.—A summary of the business of the 40-acre and 80-acre farms is presented in Table 23. Attention is especially directed to the fact that during each year of the study, net return to the capital of the 80-acre farms was considerably more than twice as great as that of the 40-acre farms. The four-year average for the former group was $1,341 and for the latter $453. The percentage return to the capital of the 80-acre group was also much greater than that returned to the capital of the 40-acre group. When measured by these tokens, therefore, size of farm appears to have considerable influence on the efficiency with which farms can be organized and operated. Some of the reasons appear later.

TABLE 23.—*Business summary for 40-acre and 80-acre farms, 1919–1922*

Item	40-acre farms				80-acre farms			
	1919	1920	1921	1922	1919	1920	1921	1922
Farms studied, number	51	53	52	14	38	37	33	16
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Output per farm	3,277	2,749	2,031	2,168	6,237	4,262	3,291	3,827
Cash output	2,919	2,360	1,690	1,834	5,688	3,717	2,913	3,515
Wheat	957	580	381	222	2,376	1,580	993	738
Potatoes	392	253	372	84	883	369	717	175
Beans	306	145	73	659	806	374	206	1,319
Sugar beets	297	704	256	283	352	443	142	
Clover (hay and seed)	218	123	151	108	369	179	306	566
Alfalfa (hay and seed)	190	79	60	22	284	222	87	120
Other crops	75	42	61	49	149	61	152	56
Livestock	247	158	127	172	221	206	116	227
Livestock products	161	208	165	164	188	190	164	274
Other sources	76	68	44	71	60	93	30	40
Noncash output	358	389	341	334	549	545	378	312
Family-used perquisites	341	389	341	334	309	442	378	312
Increase in inventories	17	0	0	0	240	103	0	0
Input per farm (other than capital)	2,169	2,431	1,941	1,872	3,357	3,469	2,854	2,574
Cash input	1,310	1,261	1,072	887	2,339	2,165	1,806	1,449
Hired labor	136	93	43	33	462	295	242	117
Contract labor	79	172	148	64	97	136	140	67
Repairs	51	33	27	29	87	78	64	49
Feed bought	147	93	61	67	182	98	66	75
Auto for farm use	131	95	107	89	180	153	170	124
Seed bought	82	89	65	80	106	200	130	108
Sacks and twine	45	57	40	47	104	109	96	126
Threshing and hulling	80	79	60	80	174	168	136	176
Taxes	198	207	270	199	350	336	416	326
Irrigation water	121	125	80	60	240	246	160	117
Livestock bought	172	111	85	71	268	220	85	71
Other sources	68	107	86	68	89	126	101	93
Noncash input	859	1,170	869	985	1,018	1,304	1,048	1,125
Decrease in inventories	0	111	112	190	0	0	139	171
Operator's labor	801	978	707	712	915	1,056	826	861
Unpaid family labor	58	81	50	83	103	248	83	93
Return to capital (output less input)	1,108	318	90	296	2,880	793	437	1,253
Return to capital, per cent	6.0	1.8	.7	2.4	8.3	2.5	1.9	5.8

Output and input per acre and return to real estate per acre.—A comparison of the output and input per acre of the two size groups is presented in Table 24. The average output per acre for the four-year period, in round figures, was $64 for the 40-acre farms and $55 for the 80-acre farms, a difference of $9 per acre in favor of the 40-acre group. The average input per acre (other than capital) was $53 for the 40-acre farms and $38 for the 80-acre farms, a difference of $14 per acre in favor of the 80-acre group. The average net return per acre for the use of capital (output less input), therefore, was approximately $5 per acre greater for the 80-acre farms than for the 40-acre farms.

TABLE 24.—*Output per acre, input per acre, and net return to real estate per acre on 40-acre and 80-acre farms, 1919–1922*

Item	40-acre farms				80-acre farms			
	1919	1920	1921	1922	1919	1920	1921	1922
	Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Output per acre	82	68	51	54	78	53	41	48
Input per acre (other than capital)	54	60	49	47	42	43	36	32
Net return to capital per acre	28	8	2	7	36	10	5	16
Use of working capital per acre at 8 per cent	4	4	3	3	3	3	2	2
Net return to real estate per acre	24	4	—1	4	33	7	3	14

Table 24 further shows the average net return to real estate per acre after allowing 8 per cent for the use of working capital. For the four-year period this was approximately $8 per acre for the 40-acre farms and $14 per acre for the 80-acre farms, the difference being $6 in favor of the 80-acre farms.

Use of labor.—Table 25 presents a comparison of the efficiency with which labor was used by the two groups of farms. The 40-acre farms kept an average of 3.5 work animals per farm, whereas the 80-acre farms kept an average of 4.6. That is, with about one and one-third times as many work animals per farm, the 80-acre farms produced nearly twice as many acres of crops. In other words, the 80-acre farms handled a little more than 15 acres of crops per work horse and the 40-acre farms, 10 acres. The larger farms also used man labor more efficiently than the smaller ones. For each month of man labor used there were averages of approximately 2.8 crop acres on the 40-acre farms and 4.2 acres on the 80-acre farms. In proportion to the crop area, the 40-acre farms produced more sugar beets and beans than did the 80-acre farms. This, however, is not sufficient to account for the difference in the crop acres handled per horse and per month of man labor by the two groups.

TABLE 25.—*The use of man and horse labor on 40-acre and 80-acre farms, 1919–1922*

Item	40-acre farms				80-acre farms			
	1919	1920	1921	1922	1919	1920	1921	1922
Work horses per farm	3.1	3.6	3.4	4.0	4.8	4.4	4.9	4.4
Crop acres per work horse	11	10	10	9	15	16	14	16
Crop acres per month of man labor	3.0	2.9	2.7	2.6	4.3	4.2	4.1	4.2

Average crop yields.—The 40-acre farms obtained the highest yields of alfalfa hay, sugar beets, beans, and alsike clover; the 80-acre farms, on the other hand, obtained the highest average yields of wheat, potatoes, and red clover seed. Using the index of crop yields as the measuring stick (the comparative yield of all crops), the 40-acre farms ranked three points above the 80-acre farms. With respect to crop yields, then, the 40-acre farms had a slight advantage, which, however, is not sufficient to justify the theory so often advanced that much better yields and more satisfactory financial returns would be obtained by reducing the size of the farm, the type of farming remaining the same.

Thus it is evident that the 80-acre farms were organized and operated more effectively than were the 40-acre farms. The 40-acre farms had, in round figures, 5 per cent more of the capital tied up in buildings and equipment than had the 80-acre farms. A work horse handled one-half more crop acres on the 80-acre farms than on the 40-acre farms. For each month of man labor used, 2.8 crop acres were taken care of on the 40-acre farms as compared with 4.2 acres on the 80-acre farms. The average net return to real estate for the four-year period was $6.50 per acre greater for the 80-acre farms than the 40-acre group.

Other things being equal the acreage in each crop is twice as large on an 80-acre farm as on one of 40 acres. For this reason practically all field operations can be performed more economically on the former than on the latter. A few illustrations should suffice to make this clear.

It requires about the same length of time to repair the hay-making equipment and get it into action and to assemble a hay-stacking crew for 10 acres of alfalfa hay as for 20 acres. In general, as much time is consumed in turning for the cultural operations on a 40-acre farm as on an 80-acre farm, the time per unit area varying with the size and shape of the fields, length of rows, etc. The head of water on a 40-acre farm is only half as large as on an 80-acre farm. This enables the 80-acre farmer to irrigate about twice as many acres in a given time as can the 40-acre farmer. Thus the 80-acre farmer can use the various factors of production to much better advantage than can the 40-acre farmer, the type of farming being the same in each case.

DAIRY AND GENERAL CROP FARMS

The farms classified as "Dairy and general crop farms," in most cases, produced the general field crops in addition to carrying on the dairy enterprise. Dairying was an important enterprise on each of these farms and in a few instances the dairy herd was practically the only source of income. There was a wide variation in the quality of the cows, the different herds ranging from grades of low-producing capacity to well-bred herds of high producers.

The small number of dairy and crop farms found in the district made a detailed study of the dairy enterprise impracticable. The district is so well adapted to the production of dairy products and dairy cattle, however, that the results of the study of the few dairy farms found is presented to indicate, in a rough way, the possibilities of this industry in the district and to compare dairy farming with the two other types. In the discussion that follows this group is here referred to as "dairy farms."

UTILIZATION OF LAND

In obtaining the records it was necessary to drop some farms and add others from year to year, hence the variation in the number of farms during the four years (Table 26). The average size of these dairy farms was about 77 acres. This is approximately 4 acres larger than the average of the general crop farms. As would be expected, these farms had a much higher percentage of the tillable land in pasture and alfalfa and a much lower percentage in wheat than had the general crop farms.

TABLE 26.—*Utilization of land on dairy farms, 1919–1922*

Item	1919		1920		1921		1922	
Farms studied, number	8		11		16		10	
Size of farm	*Acres* 78.5		*Acres* 77.0		*Acres* 77.6		*Acres* 75.5	
Tillable land:								
Crop acreage	64.4		62.8		57.5		61.4	
Crop land rented out					1.8		1.7	
Pasture	7.3		6.2		11.7		6.9	
Total	71.7		69.0		71.0		70.0	
Pasture not tillable	2.0		3.7		1.4		1.8	
Other land	4.8		4.3		5.2		3.7	
Crop acreage in:	*Acres*	*P. ct.*	*Acres*	*P. ct.*	*Acres*	*P. ct.*	*Acres*	*P. ct.*
Wheat	13.2	20	20.8	33	14.3	25	19.2	31
Alfalfa	25.0	39	16.5	26	23.8	41	22.8	37
Beans	9.5	15	7.8	12	2.7	5	7.0	11
Potatoes	.8	1	1.0	2	1.6	3	2.4	4
Sugar beets	7.0	11	3.8	6	4.5	8	1.1	2
Clover	1.9	3	5.2	8	.3	1	.6	1
Barley and oats	3.3	5	3.1	5	2.9	5	2.4	4
Corn	.5	1	1.9	3	4.3	7	3.3	5
Garden and orchard	2.9	5	2.2	4	1.8	3	2.2	4
Other crops	.3	(1)	.5	1	1.3	2	.4	1

[1] Less than one-half of 1 per cent.

DISTRIBUTION OF LIVESTOCK

The different kinds of livestock kept and the number of animal units of each kind are shown in Table 27. There was an average of 22 dairy cattle animal units per farm during the four years of the study. This is about five times the number kept on the general crop farms. This is the only striking difference in the livestock kept by the three types of farms.

TABLE 27.—*Distribution of livestock on dairy farms, 1919–1922*

Item	1919	1920	1921	1922
	Number	*Number*	*Number*	*Number*
Farms studied	8	11	16	10
Animal units per farm [1]	34.2	27.8	32.2	29.2
Work stock	4.3	4.2	5.2	5.1
Productive stock	29.9	23.6	27.0	24.1
Cattle	25.6	19.4	21.7	20.6
Sheep	.6	.3	2.1	.1
Hogs	1.6	1.6	1.3	2.0
Brood mares and colts	1.2	1.3	.9	.3
Poultry	.9	1.0	1.0	1.1

[1] In order to compare the livestock kept on the different farms, it is necessary to have a standard of comparison. The standard here used is the "Animal unit." It is represented by one mature horse, mule, cow, or steer. Also by as many smaller animals as require the feed of one of these mature animals. Usually 2 head of young cattle, 2 colts, 5 hogs, 10 pigs, 7 sheep, 14 lambs or 100 chickens are considered equivalent to one animal unit.

DISTRIBUTION OF CAPITAL

The average values of real estate per acre presented in Table 28 do not differ materially from the corresponding values shown in Table 6. As would be expected, however, the dairy farms had a much greater proportion of the total capital invested in feed and supplies, livestock, machinery, and buildings than had the general crop farms.

TABLE 28.—*Distribution of capital on dairy farms, 1919–1922*

Items	1919	1920	1921	1922
Farms studied, number	8	11	16	10
	Dollars	*Dollars*	*Dollars*	*Dollars*
Value of real estate per acre	361	366	283	266
Average capital per farm	34,771	33,549	26,318	24,557
Real estate	28,372	28,183	21,960	20,075
Land	25,772	24,268	18,582	16,180
Dwelling	1,550	2,458	2,419	2,399
Other buildings	1,050	1,457	959	1,496
Working capital	6,399	5,366	4,358	4,482
Livestock	3,676	2,835	2,650	2,738
Machinery	1,471	1,389	1,260	1,221
Feeds and supplies	996	903	242	308
Other working capital	256	239	206	215

BUSINESS SUMMARY

A summary of the business of the dairy farms is presented in Table 29. Of the total output, averages of 52, 46, 59, and 54 per cent, respectively, were derived from the sale of livestock and livestock products in 1919, 1920, 1921, and 1922. Since practically all of the income from these two sources came from the dairy herd, the type of farming was rather well balanced between cash crops and the dairy enterprise.

TABLE 29.—*Business summary for dairy farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	8	11	16	10
Size of farm, acres	78.5	77.0	77.6	75.5
	Dollars	*Dollars*	*Dollars*	*Dollars*
Output per farm	8,232	5,858	4,556	4,450
Cash output	7,524	5,353	4,134	4,110
Crops	3,215	2,564	1,311	1,622
Sale livestock	857	604	688	556
Sale livestock products	3,433	2,063	2,001	1,865
Other sources	19	122	134	67
Noncash output	708	505	422	340
Family perquisites	367	505	422	340
Increase inventories	341			
Input per farm (other than of capital)	4,447	4,629	3,459	3,321
Cash input	2,833	2,727	2,278	2,130
Noncash input	1,614	1,902	1,181	1,191
Decrease inventories		427	118	220
Operator's labor	990	1,160	862	816
Unpaid family labor	624	315	201	155
Return to capital	3,785	1,229	1,097	1,126
Return to capital, per cent	10.9	3.7	4.2	4.6

The total value of the capital used in computing the percentage return to capital is considerably lower for 1921 and 1922 than for 1919 and 1920, chiefly because of the lower value of real estate per acre (see Table 28).

In 1919 the return to capital was 10.9 per cent; in 1920 it was but 3.7 per cent. In 1919 records were obtained from two very successful farms having high-producing cows. In 1920 it was necessary to replace both of these farms with others which were much less efficient. This and the general slump in the prices of farm products caused the abrupt drop in the percentage return to capital in 1920. During the last two years of the survey the return to capital increased gradually, reaching 4.2 per cent in 1921 and 4.6 in 1922, while for the four-year period the average was 5.8 per cent.

VARIATION IN HERD AVERAGE VALUE OF DAIRY PRODUCTS PER COW

The herd average value of the dairy products per cow presented in Table 30 includes the estimated value of the products used on the farm as well as what was sold. There was considerable variation in the herd average per cow. This variation was mainly due to three factors:

(1) The price received for the product of the different herds varied considerably. Some of the milk was sold at retail prices, some at wholesale fluid-milk prices, and some on a butterfat basis.

(2) The methods used in feeding the different herds varied widely. During the pasture season some herds were on excellent pasture for five to six months and in addition were fed all the alfalfa hay they would eat and in some instances grain; other herds were fed alfalfa hay and run on very closely cropped pasture; other herds were kept in dry lots all summer and fed alfalfa hay, some herds receiving grain in addition to the hay, whereas others received none; some herds received corn silage or sugar-beet pulp while others did not.

(3) The average producing ability per cow of some herds was high whereas that of other herds was low, so low, in fact, that some of the farmers would have been better off financially had they kept only enough cows to supply the family with dairy products.

TABLE 30.—*Variation in herd average value of dairy products per cow on dairy farms, 1919–1922*

Value of dairy products per cow	1919		1920		1921		1922	
	Number of farms	Herd average per cow	Number of farms	Herd average per cow	Number of farms	Herd average per cow	Number of farms	Herd average per cow
		Dollars		*Dollars*		*Dollars*		*Dollars*
Under $100					2	64	1	68
$100 to $149	4	122	4	118	5	115	6	126
$150 to $199			2	164	5	170	2	176
$200 to $249	1	202	2	204	3	225	1	205
$250 to $299	1	251	2	278	1	295		
$300 and over	2	307	1	318				

ORCHARD AND GENERAL CROP FARMS

The production of fruit on a commercial scale was an important enterprise on a limited number of farms each year of the study. The orchards consisted almost entirely of apples, although there were some other tree fruits. Most of the orchard farms produced the field crops common to the district studied in addition to conducting the orchard enterprise, but the apple was the chief source of income on a very few farms. The farms having commercial orchards are here classified as "Orchard and general crop farms," the organization and business summary of which are presented in Tables 31 to 34, inclusive. This group is here referred to as "orchard farms."

UTILIZATION OF LAND

The average size of farm, the acres of tillable land, the crop and pasture areas, and utilization of the crop area are presented in Table 31. The average size of the orchard farms for the four-year period was approximately 58 acres. A larger acreage was devoted to the orchard than to any other enterprise; wheat was second and alfalfa third. The change in the acreage devoted to the orchard from year to year was due to the dropping of some farms from the study and the addition of others.

TABLE 31.—*Utilization of land on orchard farms, 1919–1922*

Item	1919		1920		1921		1922	
Farms studied, number	9		10		14		10	
Size of farm	*Acres* 62.2		*Acres* 59.6		*Acres* 54.9		*Acres* 55.6	
Tillable land	59.4		55.8		51.2		50.7	
Crop acreage	58.4		54.6		50.3		38.4	
Crop land rented out							10.1	
Pasture	1.0		1.2		.9		2.2	
Pasture not tillable	.3		.4		.3		.7	
Other land	2.5		3.4		3.4		4.2	
Crop acreage in:	*Acres*	*Per cent*	*Acres*	*Per cent*	*Acres*	*Per cent*	*Acres*	*Per cent*
Wheat	12.8	22	13.4	25	9.4	19	7.3	19
Alfalfa	7.4	12	7.3	13	11.2	22	8.0	21
Beans	1.6	3	1.6	3	.9	2	5.7	15
Potatoes	1.0	2	.8	1	2.8	5	3.3	9
Sugar beets	3.0	5	3.5	6	2.0	4	.4	1
Clover	1.0	2	2.0	4	7.7	15	3.2	8
Orchard and garden	30.4	52	21.7	40	14.0	28	9.3	24
Other crops	1.2	2	4.3	8	2.3	5	1.2	3

DISTRIBUTION OF LIVESTOCK

These orchard farms kept an average of 9.4 animal units per farm during the four years of the survey, of which 3.4 was the average of work animals and 3.6 of cattle. The cattle consisted of both cows and young animals. Just about enough cows, hogs, and poultry were kept to supply the needs of the farm family with dairy products, eggs, and meat. During the first three years no sheep were found on the orchard farms. A few of the farms each year had mares and colts.

TABLE 32.—*Distribution of livestock on orchard farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied	*Number* 9	*Number* 10	*Number* 14	*Number* 10
Animal units [1] per farm	9.0	8.8	10.5	9.4
Work stock	2.7	3.0	4.3	3.4
Productive stock	6.3	5.8	6.2	6.0
Cattle	2.8	2.7	4.4	4.4
Sheep				.4
Hogs	2.3	2.1	.6	.1
Brood mares and colts	.2	.2	.1	.3
Poultry	1.0	.8	1.1	.8

[1] In order to compare the livestock kept on the different farms, it is necessary to have a standard of comparison. The standard here used is the "Animal unit." It is represented by one mature horse, mule, cow, or steer. Also by as many smaller animals as require the feed of one of these mature animals. Usually 2 head of young cattle, 2 colts, 5 hogs, 10 pigs, 7 sheep, 14 lambs, or 100 chickens are considered equivalent to one animal unit.

DISTRIBUTION OF CAPITAL

As would be expected, the average value of real estate per acre was considerably higher in this group of farms than in the group of general farms or the group of dairy farms. This difference is due to the cost of developing bearing orchards. Table 33 shows that the average value of real estate (the estimated sales value) decreased from $533 per acre in 1919 to $275 in 1922. This decrease was due (1) to the general drop in the value of real estate during this period and (2) to the decreasing percentage of the farm area that was in orchard from year to year. In 1919 there was a large apple crop which required considerable "other working capital" (cash and credit) to finance the harvesting and marketing operations. Aside from this the distribution of the capital is similar to that of the general crop farms.

TABLE 33.—*Distribution of capital on orchard farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	9	10	14	10
Value of real estate per acre	*Dollars* 533	*Dollars* 439	*Dollars* 305	*Dollars* 275
Average capital per farm	36,476	28,390	18,398	16,828
Real estate	33,167	26,149	16,743	15,287
Land	28,989	22,912	14,151	12,747
Dwelling	3,200	2,428	1,993	2,212
Other building	978	809	599	328
Working capital	3,309	2,241	1,655	1,541
Livestock	674	602	476	581
Machinery	702	823	636	522
Feed and supplies	239	404	148	157
Other working capital	1,694	412	395	281

BUSINESS SUMMARY

The year 1919 was by far the best financially, 1921 was second best, and 1922 was the poorest (see Table 34). Both 1920 and 1922 were very unsatisfactory apple years. Generally speaking, the yield was light and the price received for apples was low both years. This is shown also by the cash receipts for the sale of fruit. Of the total cash output, receipts from the sale of fruit were 71 per cent in 1919, 25 per cent in 1920, 64 per cent in 1921, and 29 per cent in 1922. The return to capital was 12 per cent, 0.6 per cent, 8.7 per cent, and 0.4 per cent, respectively, in 1919, 1920, 1921, and 1922.

The district has thoroughly demonstrated that it can produce good yields of excellent apples and the returns might have been considerably higher if all of the orchards had been properly pruned, sprayed, and irrigated; if the fruit had been thinned sufficiently to get the desired size of apple; if the apples had been graded more thoroughly; and if an effective marketing agency had been available for disposing of the crop.

Of the important crop enterprises of the district studied, apple production, it appears, is subject to the greatest fluctuations in net returns. When the apple crop of the East and Middle West is light, the Northwestern growers are likely to receive very attractive returns for their apples. With Eastern and Middle Western growers

striving for better quality at lower costs of production, and with much lower freight rates in their favor, Northwestern growers must expect low prices when there is a very heavy production in the East and Middle West.

TABLE 34.—*Business summary for orchard farms, 1919–1922*

Item	1919	1920	1921	1922
Farms studied, number	9	10	14	10
Size of farm, acres	62.2	59.6	54.9	55.6
	Dollars	*Dollars*	*Dollars*	*Dollars*
Output per farm	9,469	3,639	4,522	2,246
Cash output	8,873	3,188	4,073	1,847
Fruit (mainly apples)	6,326	811	2,612	528
Other crops	1,925	1,727	1,137	870
Sale livestock	458	296	84	98
Sale livestock products	137	137	108	178
Other sources	27	217	132	173
Noncash output	596	451	449	399
Family perquisites	531	451	449	399
Increase inventories	65			
Input per farm (other than of capital)	5,107	3,477	2,913	2,321
Cash input	4,060	1,835	1,831	1,222
Noncash input	1,047	1,642	1,082	1,099
Decrease inventories		156	206	227
Operator's labor	883	1,100	716	765
Unpaid family labor	164	386	160	107
Return to capital	4,362	162	1,609	75
Return to capital, per cent	12.0	.6	8.7	−.4

NOTE.—The total value of the capital used in computing the percentage return to capital is considerably lower for 1921 and 1922 than for 1919 and 1920. This is due chiefly to the lower value of real estate per acre (Table 33).

RELATIVE RETURNS FROM THREE TYPES OF FARMING

A comparison of the size of farm, value of real estate per acre, capital per farm, and return to capital of the three types of farming is presented in Table 35. The dairy farms averaged about 19 acres larger than the orchard farms and 4 acres larger than the general crop farms. The average capital of the dairy farms was about $4,000 larger than that of either of the other two groups. During the period of deflation, the capital of the orchard farms decreased much faster than that of the dairy or the general crop farms, because of the rapid drop in the value of the real estate of the orchard group.

For the four-year period, the dairy farms made the highest average net return to the farm capital, the orchard farms second highest and the general crop farms the lowest. The orchard farms had one excellent year (1919), one fairly good year (1921), and two very poor years. During the whole period the business of the dairy farms was far more stable than that of the other two groups, because the price of dairy products did not fluctuate so widely as did the prices of apples and the general field crops. A number of the farms furnished the city of Twin Falls with fluid milk. If the industry is expanded it must be done with the expectation of marketing the product on some other basis than as fluid (market) milk.

TABLE 35.—*Comparative returns from three types of farming, 1919–1922*

Item	General crop farms	Dairy and general crop farms	Orchard and general crop farms
Size of farm:	*Acres*	*Acres*	*Acres*
1919	74	78	62
1920	72	77	60
1921	72	78	55
1922	75	76	56
Value of real estate per acre:	*Dollars*	*Dollars*	*Dollars*
1919	373	361	533
1920	367	366	439
1921	261	283	305
1922	250	266	275
Capital per farm:			
1919	30,786	34,771	36,476
1920	29,543	33,549	28,390
1921	21,199	26,318	18,398
1922	20,880	24,557	16,828
Return to capital:			
1919	2,224	3,785	4,362
1920	673	1,229	162
1921	322	1,097	1,609
1922	1,102	1,129	−75
Returned to capital, per cent:			
1919	7.2	10.9	12.0
1920	2.3	3.7	.6
1921	1.5	4.2	8.7
1922	5.3	4.6	−.4
Average return to capital, 1919–1922	4.1	5.8	5.2

CULTURAL PRACTICES AND LABOR USED PER OPERATION IN PRODUCING SEVEN CROPS, 1921

The cultural practices employed in producing each of the seven crops in 1921 as well as the average amounts of labor used per operation are presented in Tables 36 to 42. Column 1 of each of the tables shows the various operations performed; column 2 the percentage of the farmers that performed each operation; column 3 the percentage of the total acreage of each crop covered by the respective operations; column 4 the times that each operation was performed on the acreage covered; and columns 5 and 6 the average hours of man and horse labor expended in performing each operation once over. Since the cultural practices varied considerably from farm to farm, but few of the operations were performed on the total acreage of each crop.

By applying the rates of labor required to perform the respective operations, as shown in these tables, to the times each operation is performed on his farm, a farmer may calculate the hours he used in the production of an acre of each crop. Then by applying current rates for man and horse labor, the approximate labor cost per acre for each may be computed. Furthermore, Tables 36 to 42 are helpful to those not familiar with the agriculture of the district studied, since they show at a glance the usual cultural operations performed in the production of each crop.

TABLE 36.—*Cultural practices and labor expended per operation in the production of wheat, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Clean ditches	100	97	1.0	1.0	0.1
Manure	33	39	1.0	2.4	4.5
Crown alfalfa	6	8	1.0	1.7	7.4
Plow	98	93	1.0	4.1	14.2
Disk	34	34	1.5	.8	3.4
Harrow (spike)	99	94	2.2	.6	2.1
Harrow (spring)	23	30	1.4	.7	2.6
Level	79	81	1.1	.9	3.2
Float	17	15	1.2	.8	3.1
Roll	28	36	1.2	.7	1.9
Haul seed	73	73	1.0	.2	.5
Clean seed	8	9	1.0	.5	
Treat seed	94	94	1.0	.2	
Drill seed	100	100	1.0	.8	2.8
Corrugate	100	100	1.0	1.0	2.1
Irrigate	100	100	2.6	1.3	
Cut [1]	84	89	1.0	1.0	3.9
Shock	100	99	1.0	1.9	
Stack	18	11	1.0	4.9	4.9
Haul fuel	89	94	1.0	.2	.4
Shock-thresh	80	80	1.0	4.7	5.6
Stack-thresh	12	11	1.0	2.2	
Contract-thresh [2]	8	9			
Haul to market	51	[3] 51	1.0	.4	.7
Haul to granary	49	[3] 49	1.0	.3	.4
Haul from granary to market	49	[3] 49	1.0	.5	1.1

[1] Sixteen per cent of the farmers hired their wheat cut and 11 per cent of the acreage harvested was hired cut.
[2] The price paid for contract threshing covered the hauling of the grain from the shock to the thresher.
[3] The hauling percentages are based on bushels.

TABLE 37.—*Cultural practices and labor expended per operation in the production of alfalfa hay, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Clean ditches	97	99	1.0	1.0	0.0
Manure	1	(1)	1.0	10.0	10.0
Remove trash	7	9	1.0	.9	1.7
Renovate	4	9	1.1	1.4	4.1
Harrow	2	2	1.8	1.6	4.7
Disk	1	1	1.0	1.0	4.0
Seed	19	17	1.0	.5	.2
Corrugate	89	91	1.0	1.2	2.5
Irrigate	100	100	4.3	1.0	
Mow, first cutting	100	100	1.0	1.2	2.4
Rake and bunch	100	100	1.1	.7	1.4
Shock	60	53	1.0	1.5	
Stack	100	100	1.0	5.0	5.9
Mow, second cutting	100	100	1.0	1.2	2.4
Rake and bunch	100	100	1.1	.7	1.3
Shock	60	53	1.0	1.5	
Stack	100	100	1.0	4.8	5.8
Mow, third cutting	100	100	1.0	1.2	2.4
Rake and bunch	100	100	1.1	.7	1.3
Shock	60	53	1.0	1.4	
Stack	100	100	1.0	3.7	4.4

[1] Less than one-half of 1 per cent.

TABLE 38.—*Cultural practices and labor expended per operation in the production of sugar beets, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Clean ditches	96	98	1.0	1.0	0.1
Remove trash	4	2	1.0	.9	1.9
Manure	76	46	1.0	12.4	31.4
Crown alfalfa	20	10	1.0	5.6	17.8
Plow	100	100	1.0	5.0	16.5
Disk	50	58	1.9	1.2	4.8
Float	34	48	1.7	.7	2.4
Level	92	93	1.3	.9	3.5
Harrow (spike)	98	99	2.9	.7	2.5
Harrow (spring)	28	22	1.6	1.2	4.3
Roll	16	17	1.0	.7	1.8
Corrugate	82	84	1.4	1.0	2.0
Plant	100	100	1.0	1.0	2.0
Replant	4	1	1.0	2.3	4.7
Roll after plant	10	17	1.0	.7	1.4
Spray	8	7	1.0	.7	1.0
Cultivate	100	100	4.3	1.4	2.7
Furrow	24	41	1.4	1.2	2.4
Irrigate [1]	100	99	5.2	1.9	
Block and thin [2]	10	2	1.0	30.4	
Hoe, first	20	10	1.0	16.5	
Hoe, second	20	8	1.0	13.1	
Hoe, third	8	5	1.0	15.9	
Lift	84	87	1.0	4.4	12.9
Top and load	4	1	1.0	20.0	
Haul beets [3]	66	79	1.0	6.8	23.3
Haul laborers	2	1	1.0	3.9	7.8

[1] Ten acres were abandoned before being irrigated.
[2] Most of the blocking, thinning, hoeing, topping, and loading was done under contract.
[3] Twenty-one per cent of the total acreage was hired hauled.

TABLE 39.—*Cultural practices and labor expended per operation in production of potatoes, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Clean ditches	100	100	1.0	0.8	0.1
Remove trash	6	7	1.0	.8	1.1
Manure	26	12	1.0	8.5	14.6
Crown alfalfa	42	32	1.0	3.6	12.8
Plow	100	100	1.0	5.1	18.2
Disk	26	29	1.7	1.0	4.4
Harrow (spike)	100	100	2.9	.6	2.0
Harrow (spring)	22	20	1.3	1.0	3.8
Float	24	28	1.1	.8	2.9
Level	54	58	1.1	.7	2.7
Roll	12	12	1.0	.8	1.7
Cut seed	100	100	1.0	6.3	
Treat seed	76	81	1.0	1.0	
Haul seed	66	74	1.0	.7	1.4
Plant	100	100	1.0	2.7	4.8
Cultivate	100	100	3.5	2.0	3.8
Hoe	74	91	1.0	4.9	
Pull weeds	14	15	1.0	4.4	
Furrow	80	80	1.9	1.7	2.5
Irrigate	100	100	4.3	1.4	
Spray	2	2	1.0	1.7	1.7
Dig [1]	54	62	1.0	4.9	13.3
Pick [1]	8	6	1.0	16.7	
Grade [1]	24	27	1.0	4.0	5.2
Haul to market	54	50	1.0	7.0	14.4
Haul to cellar	44	49	1.0	4.3	7.3
Sort	36	42	1.0	12.1	
Haul cellar to market	34	39	1.0	5.2	12.6

[1] Digging, picking, and grading were partly done by contract labor.

TABLE 40.—*Cultural practices and labor expended per operation in the production of beans, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Clean ditches	100	100	1.0	0.9	0.2
Manure	39	19	1.0	9.1	19.5
Crown alfalfa	5	2	1.0	7.8	22.8
Harrow (spike)	100	100	2.6	.7	2.4
Harrow (spring)	34	32	3.5	.9	3.5
Disk	51	51	1.6	1.0	4.1
Plow	100	98	1.2	3.8	13.1
Level	56	56	1.0	1.0	3.5
Roll	27	27	1.0	.8	2.6
Corrugate	88	80	1.2	.9	2.0
Irrigate	100	100	4.3	1.2	----------
Float	51	48	1.1	.6	2.0
Plant	100	100	1.0	.9	1.7
Cultivate	100	100	3.4	1.1	2.1
Hoe	88	82	1.2	9.3	----------
Pull weeds	2	8	1.0	.3	----------
Haul seed	2	4	1.0	.2	.5
Cut	100	100	1.0	1.5	3.0
Rake	5	9	1.0	.8	2.4
Bunch	98	96	1.0	4.6	----------
Stack	44	37	1.0	5.3	5.9
Haul fuel	61	54	1.0	.4	.8
Thresh:					
From field	56	62	1.0	6.4	6.8
From stack	44	38	1.0	4.6	.4
Haul to market	100	100	1.0	1.3	2.6
Clean for market	2	2	1.0	.9	----------

TABLE 41.—*Cultural practices and labor expended per operation in the production of red clover seed, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Remove trash	20	16	1.0	1.3	2.3
Clean ditches	96	97	1.0	1.2	.0
Manure	2	(1)	1.0	3.3	10.0
Renovate	4	3	1.3	1.4	3.6
Harrow	5	2	1.0	1.4	4.7
Rogue	2	2	1.0	3.3	----------
Seed	16	21	1.0	.7	----------
Corrugate	98	97	1.1	1.2	2.4
Irrigate:					
When seeding	13	19	1.0	.9	----------
Hay crop	100	100	1.6	.9	----------
Seed crop	100	100	1.9	.8	----------
Hay crop:					
Mow [2]	96	96	1.3	1.0	2.0
Rake	7	7	1.0	.8	1.5
Rake and bunch	86	88	1.1	.8	1.6
Shock	49	41	1.1	1.6	----------
Stack	95	94	1.0	4.3	5.2
Seed crop:					
Cut (bunched as cut)	7	6	1.0	1.5	2.4
Cut	93	94	1.0	1.4	2.8
Rake and bunch with rake	24	19	1.0	.9	1.6
Rake (no bunching)	5	5	1.0	.5	1.0
Shock (bunched with rake)	9	9	1.0	1.9	----------
Shock (from window)	5	5	1.0	1.2	----------
Shock (from mower)	64	70	1.0	3.2	----------
Turn	9	7	1.0	1.2	----------
Stack	11	6	1.0	4.6	6.8
Hull:					
From stack	11	6	1.0	2.2	.3
From field	89	94	1.0	5.2	5.6
Haul fuel	87	89	1.0	.3	.5
Haul to market	98	84	1.1	.4	.9

[1] Less than one-half of 1 per cent.
[2] Four per cent of the total acreage were either pastured or clipped.

TABLE 42.—*Cultural practices and labor expended per operation in the production of alsike clover seed, 1921*

Operations	Percentage of total records	Percentage of total acreage	Times over	Average hours of labor per acre (once over)	
				Man	Horse
Remove trash	21	13	1.0	1.0	1.6
Clean ditches	100	100	1.0	1.1	.1
Renovate	14	13	1.0	.8	2.1
Harrow	14	12	1.0	.7	2.4
Corrugate	93	96	1.0	1.2	2.5
Irrigate	100	100	2.7	1.0	
Cut seed	100	100	1.0	2.0	3.5
Shock (from mower)	86	88	1.0	5.1	
Rake	7	7	1.0	1.0	2.0
Hull from field	100	100	1.0	8.9	8.8
Haul fuel	93	93	1.0	.4	.8
Haul to market	100	100	1.0	.5	1.0

COST OF PRODUCING SEVEN CROPS, 1919–1921

The cost data presented herewith were obtained by the survey method in connection with the farm business analysis survey. The cost study covered the years 1919, 1920, and 1921 and included the seven principal field crops grown on the Twin Falls south side irrigation project. The cost data are presented on an owner-farm basis. So few records were obtained on rented farms that no attempt was made to compute the cost of production by tenants on these farms. Because of the necessity of distributing the many joint costs involved in the operation of each farm more or less arbitrarily to the respective crop and livestock enterprises, the cost data presented should be considered only as close approximations.

The acreage of each crop harvested equaled the acreage seeded each year with the exception of wheat in 1921 and sugar beets in 1920 and 1921. The expense incurred in connection with the abandoned acreage was charged to the acreage harvested. The land values shown in Table 43 are intended to represent the conservative estimates of the farmers visited. These estimates were based on neighborhood sales.

TABLE 43.—*Number of records, area seeded and harvested, yield per acre, average price received, and average value of land per acre*

Item	Wheat	Alfalfa hay	Sugar beets	Potatoes	Beans	Red clover seed	Alsike clover seed
Records obtained:							
1919	66	48	37	42	44	21	8
1920	43	37	39	28	35	21	8
1921	124	99	46	50	41	55	14
Acreage seeded:							
1919	1,921.7	731.5	728.5	335.2	994.2	234.5	86.5
1920	1,283.5	748.2	686.2	290.5	581.8	235.0	131.5
1921	3,315.4	1,733.5	837.9	598.5	540.5	836.0	180.5
Acreage harvested:							
1919	1,921.7	731.5	728.5	335.2	994.2	234.5	86.5
1920	1,283.5	748.2	673.8	290.5	581.8	235.0	131.5
1921	3,300.4	1,733.5	786.1	598.5	540.5	836.0	180.5
Average yield per acre:	*Bushels*	*Short tons*	*Short tons*	*100 lbs.*	*Pounds*	*Pounds*	*Pounds*
1919	41.4	4.3	9.9	140	1,210	302	316
1920	43.3	3.9	13.5	168	1,273	226	431
1921	45.5	4.0	10.0	151	1,175	211	353
Average price received per unit:	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Cents*	*Cents*	*Cents*
1919	1.85	15.63	11.00	1.77	7.0	45.6	39.0
1920	1.38	8.37	12.00	.945	5.7	12.0	22.3
1921	.825	4.80	6.00	.935	4.2	15.0	15.1
Average value of land per acre:					*Dollars*	*Dollars*	*Dollars*
1919	389	376	414	406	364	382	338
1920	384	377	419	407	363	402	416
1921	278	280	310	289	286	293	287

LABOR AND MATERIALS USED PER ACRE

The labor used in the production of each crop consisted of three items: (1) The man labor performed by the farmers, by other members of the farm family, and by hired men; (2) the labor performed by the horse kept on the farm; and (3) the labor (both man and horse) done under contract or by the job. Contract labor is expressed in dollars per acre, since reliable estimates of the hours of labor for this item were not obtained.

The water used is also expressed in dollars per acre. The cost of water per acre was determined by dividing the cost of water per farm by the acres irrigated. Since the total cost of water is the same for all farms of the same size irrespective of the acreage irrigated, the cost of water per acre varied considerably from farm to farm.

TABLE 44.—*Labor and materials expended per acre in the production of designated crops*

Item	Year	Wheat	Alfalfa hay	Sugar beets	Potatoes	Beans	Red clover seed	Alsike clover seed
Labor per acre:		*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*	*Hours*
Direct man hours other than contract	1919	24.2	33.2	54.1	65.0	43.8	25.6	18.0
	1920	26.2	30.8	60.9	68.6	50.7	25.7	25.8
	1921	24.6	28.5	52.8	61.4	46.7	23.3	21.4
Direct horse hours other than contract	1919	42.2	32.6	93.9	82.3	50.0	23.8	11.5
	1920	43.7	32.3	122.8	81.7	59.4	21.4	16.0
	1921	46.3	31.0	106.0	85.4	61.3	22.5	17.7
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Contract and job labor	1919	-------	-------	30.11	11.19	-------	-------	-------
	1920	.30	-------	37.62	23.64	0.09	-------	-------
	1921	-------	-------	26.50	16.19	-------	-------	-------
Materials per acre:		*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Seed	1919	98	10.4	15.0	987	62	8.3	6.5
	1920	100	10.2	15.5	950	70	8.1	6.6
	1921	104	10.5	17.0	1,012	65	9.4	6.3
		Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Sacks	1919	-------	-------	-------	124	2.1	2.0	2.4
	1920	.4	-------	-------	160	5.2	2.2	3.4
	1921	1.4	-------	-------	138	1.4	1.7	2.9
		Loads	*Loads*	*Loads*	*Loads*	*Loads*	*Loads*	*Loads*
Manure	1919	.5	-------	3.4	.4	.6	-------	-------
	1920	.4	-------	5.8	.5	1.4	-------	-------
	1921	1.0	-------	5.4	1.0	2.0	-------	-------
		Short tons	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*
Fuel	1919	.04	-------	-------	-------	.05	.07	.05
	1920	.05	-------	-------	-------	.05	.07	.06
	1921	.04	-------	.01	-------	.06	.06	.11
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Irrigation water	1919	3.33	3.28	4.06	3.22	3.32	3.28	3.13
	1920	3.37	3.26	3.30	3.22	3.35	3.31	3.31
	1921	2.14	2.14	2.27	2.12	2.17	2.14	2.13

The approximate average cost per acre and per unit of product for the seven principal crops, with and without interest included as an item of cost, is shown in Table 45. In this table the cost figures are assembled under two headings: "Operating costs per acre," and "Total net cost per acre and per unit of product."

OPERATING COSTS PER ACRE

Operating costs are divided into three groups: Labor, materials, and other operating costs.

LABOR

In 1919 and 1920 the hours of direct man and horse labor (labor expended directly on the productive farm enterprises) were obtained only for the seven crops studied. This made it necessary to charge the respective crops with labor at current rates. Man labor was charged at 45 cents per hour and horse labor at 20 cents, there being very little variation in the current rates paid for hired labor during the two years.

In 1921 the total direct hours of both man and horse labor expended on all of the productive enterprises were computed for each farm. The cost of the man and horse labor was then distributed to the respective enterprises in proportion to the hours expended on each. The total cost of man labor per farm divided by the total hours of direct man labor per farm gave the cost of a direct hour of man labor. Since this was usually considerably higher for each farm than the current rate paid hired labor in the section studied, the direct man hours were charged to the respective crops at 30 cents per hour, the current rate. The difference between the actual cost per hour and 30 cents per hour was treated as an item of overhead.

TABLE 45.—*Summary of cost per acre and per unit for designated crops, 1919–1921*

Item	Wheat			Alfalfa hay			Sugar beets			Potatoes		
	1919	1920	1921	1919	1920	1921	1919	1920	1921	1919	1920	1921
Operating cost per acre:	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Direct man labor	10.89	11.79	7.38	14.94	13.86	8.55	24.34	27.40	15.84	29.25	30.87	18.42
Direct horse labor	8.44	8.74	3.34	6.52	6.46	2.20	18.78	24.56	5.94	16.46	16.34	6.16
Contract labor	------	.30	------	------	------	------	30.11	37.62	26.50	11.19	23.64	16.19
Total	19.33	20.83	10.72	21.46	20.32	10.75	73.23	89.58	48.28	56.90	70.85	40.77
Materials:												
Water	3.33	3.37	2.14	3.28	3.26	2.14	4.06	3.30	2.27	3.22	3.22	2.12
Seed	3.43	3.87	2.08	.69	.94	1.10	2.28	3.10	3.59	14.93	48.10	12.19
Sacks and twine	.98	.75	.83	------	------	------	------	------	------	18.55	22.32	11.89
Fuel	.33	.46	.47	------	------	------	------	------	------	------	------	------
Manure	.32	.56	------	.02	------	------	2.84	3.01	------	.30	.69	------
Total	8.39	9.01	5.52	3.99	4.20	3.24	9.18	9.41	5.86	37.00	74.33	26.20
Other operating costs:												
Threshing and hulling	2.64	3.91	2.81	------	------	------	------	------	------	------	------	------
Use of machinery	2.54	2.20	2.88	1.86	2.54	1.89	4.56	5.37	5.63	4.59	6.56	6.00
Taxes and insurances	4.40	3.72	5.48	4.28	4.03	5.77	4.37	4.84	7.76	4.69	5.01	6.46
Overhead	6.03	4.99	5.98	4.35	3.75	5.38	10.84	13.15	8.39	13.97	18.14	11.98
Miscellaneous	------	.51	.20	------	------	------	------	------	.95	.81	3.96	3.42
Total	15.61	15.33	17.35	10.49	10.32	13.04	19.77	23.36	22.73	24.06	33.67	27.86
Total operating costs	43.33	45.17	33.59	35.94	34.84	27.03	102.18	122.35	76.87	117.96	187.85	94.83
Crop credits per acre	1.63	.64	.54	1.93	1.02	.62	4.31	4.98	3.01	------	1.78	.79
Net operating cost per acre [1]	41.70	44.53	33.05	34.01	33.82	26.41	97.87	117.37	73.86	117.96	177.07	94.04
Interest (use of capital)	28.55	27.89	20.69	27.25	27.37	20.24	30.91	31.97	24.51	30.59	31.53	22.66
Total net cost per acre [2]	70.25	72.42	53.74	61.26	61.19	46.65	128.78	149.34	98.37	148.55	208.60	116.70
	Bus.	*Bus.*	*Bus.*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*Short tons*	*100 lbs.*	*100 lbs.*	*100 lbs.*
Average yield per acre	41.4	43.3	45.5	4.3	3.9	4.0	9.9	13.5	10.0	140	168	151
Average cost per unit:												
Net operating cost per unit	*Dolls.* 1.01	*Dolls.* 1.03	*Dolls.* .73	*Dolls.* 7.91	*Dolls.* 8.67	*Dolls.* 6.60	*Dolls.* 9.89	*Dolls.* 8.69	*Dolls.* 7.39	*Dolls.* .84	*Dolls.* 1.05	*Dolls.* .62
Total net cost per unit	1.70	1.67	1.18	14.25	15.69	11.66	13.01	11.06	9.84	1.06	1.24	.77

[1] Total operating costs less crop credits.
[2] Net operating costs plus interest (at 7 per cent) on the capital involved.

TABLE 45.—*Summary of cost per acre and per unit for designated crops, 1919–1921*—Continued

Item	Beans			Red clover seed			Alsike-clover seed		
	1919	1920	1921	1919	1920	1921	1919	1920	1921
Operating cost per acre:	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Direct man labor	19.71	22.82	14.01	11.52	11.56	6.99	8.10	11.61	6.42
Direct horse labor	10.00	11.88	4.26	4.76	4.28	1.77	2.30	3.20	1.56
Contract labor		.09							
Total	29.71	34.79	18.27	16.28	15.84	8.76	10.40	14.81	7.98
Materials:									
Water	3.32	3.35	2.17	3.28	3.31	2.14	3.13	3.31	2.13
Seed	4.38	4.63	2.70	2.44	3.26	3.21	2.61	2.84	2.34
Sacks and twine	.49	.92	1.08	1.50	1.37	.80	1.73	1.96	1.31
Fuel	.44	.56	.61	.72	.72	.64	.50	.67	1.24
Manure	.36	1.77							
Total	8.99	11.23	6.56	7.94	8.66	6.79	7.97	8.78	7.02
Other operating costs:									
Threshing and hulling	5.89	6.23	4.65	7.36	6.12	4.59	7.59	10.83	7.61
Use of machinery	2.84	3.64	3.28	1.48	2.16	1.75	.66	1.00	1.22
Taxes and insurances	3.26	3.30	4.29	4.00	4.60	5.97	4.26	5.40	5.98
Overhead	6.95	8.80	9.15	5.22	4.61	5.28	3.19	4.25	4.36
Miscellaneous		.14	.22		.05	.04		.03	.31
Total	18.94	22.11	21.59	18.06	17.54	17.63	15.70	21.51	19.48
Total operating costs	57.64	68.13	46.42	42.28	42.04	33.18	34.07	45.10	34.48
Crop credits per acre	2.78	1.52	.72	16.56	5.69	5.23	1.37	.57	.35
Net operating cost per acre [1]	54.86	66.61	45.70	25.72	36.35	27.95	32.70	44.53	34.13
Interest (use of capital)	26.95	27.29	21.22	27.62	29.13	21.11	23.95	29.58	20.66
Total net cost per acre [2]	81.81	93.90	66.92	53.34	65.48	49.06	56.65	74.11	54.79
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
Average yield per acre	1,210	1,273	1,175	302	226	211	316	451	353
Average cost per unit:	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Net operating cost per unit	4.5	5.2	3.9	8.5	16.1	13.2	10.3	10.3	9.7
Total net cost per unit	6.8	7.4	5.7	17.7	29.0	23.3	17.9	17.2	15.5

[1] Total operating costs less crop credits.
[2] Net operating costs plus interest (at 7 per cent) on the capital involved.

In 1921 the cost of maintaining the work horses was computed for each farm. (Table 60.) This amount divided by the total hours of direct horse labor performed per farm gave the cost of an hour of direct horse labor. The cost of horse labor as thus computed was usually less for each farm than the current rate paid for hired horse labor. For this reason, the direct horse labor was charged at the computed rate. The charges for contract labor represent the amounts actually paid out for the respective crops.

MATERIALS

The method used in computing the cost of the irrigation water is explained in the discussion of Table 44. The total value of the seed used per acre was charged in the case of all annual crops and also red and alsike clover. Since alfalfa occupies the land for about three years on the average, one-third of the seed used per acre was charged to that crop. The manure charge is based on the estimated farm value per load. Fuel was used only in threshing wheat and hulling clover seed and beans.

OTHER OPERATING COSTS

The total expense of maintaining the farm machinery (except interest) was distributed in proportion to the hours of direct horse labor expended on the respective crop and livestock enterprises. The automobile expense was first divided between farm use and personal or family use. In 1919 and 1920 the farm use portion was distributed in the same manner as the machinery charge. In 1921 the farm-automobile expense was treated as overhead expense. In distributing taxes and insurance the percentage of the land investment for each crop to the total farm investment was first determined. By applying these percentages to the total farm taxes and insurance, the charge against each crop was ascertained. Crop insurance was charged direct to the crop insured.

In the operation of every farm there are a number of general expense items which, though essential, are not chargeable to any particular enterprise. These items are grouped under the heading "overhead." This group includes such items as materials for repairing fences, buildings, and the irrigating system; the telephone; and the difference between the value of the labor expended directly on the crops and other productive enterprises at current rates and the total value of the labor expended per farm. Detailed cost accounts in other States indicate that the overhead expense for a given crop is approximately 10 per cent of the cost of labor, material, and threshing. This rate was used in computing overhead for the seven crops in 1919 and 1920.

In 1921 the total amount of overhead per farm was computed. The distribution was made in proportion to the sum of three items charged to the productive enterprises: (1) The value of the direct man labor at the current rates; (2) the cost of the direct horse labor as charged to the productive enterprises; and (3) the cost of the use of machinery. The miscellaneous items of expense consist almost entirely of storage charges and the expense of cleaning some of the crops before being marketed. The sum of the charges for labor, materials, and other operating costs equals the total operating cost per acre.

NET OPERATING COST PER ACRE

Net operating cost per acre equals total operating cost less crop credits. Crop credits consist of the value of such items as the pasture that is available after the crops are harvested, cull potatoes, cull beans, bean straw, clover straw, one cutting of red-clover hay and sugar-beet tops. The acre value of the crop credit of red-clover seed dropped from $16.56 in 1919 to $5.69 in 1920. This accounts for the increase in the net acre operating cost of producing red-clover seed in 1920.

INTEREST CHARGES

The interest charge represents 7 per cent on the capital involved in the production of each of the seven crops. Since the average rate paid on farm mortgages in Twin Falls County in 1919 was 7.2 per cent, 7 per cent was allowed for the use of capital. During each of the three years interest was a substantial part of the net cost of producing an acre of each of the seven crops.

TOTAL NET COST PER ACRE AND PER UNIT OF PRODUCT

Net cost per acre is net operating cost per acre plus the interest charge. Costs were highest in 1920 for all crops except alfalfa and lowest in 1921. The rainy harvest season of 1920 increased the acre cost of several of the crops. The cost of materials used varied most in the case of potatoes. The potato seed used was valued at $14.93 in 1919, $48.10 in 1920, and $12.19 in 1921. The high value of the seed used in 1920 was largely responsible for high cost per acre for potatoes that year. In 1921 the cost of both man and horse labor was much less than during the two previous years. This and a material drop in the value of real estate (which reduced the interest charge) and a slight drop in the value of the materials used largely account for the lower total acre cost of each of the crops in 1921.

Net cost per unit of product is net cost per acre divided by the average yield per acre. High and low yields materially affect the cost per unit.

VARIATION IN COST PER UNIT

The data presented in the foregoing tables are averages. Such figures are likely to give the reader a misconception by causing him to judge the respective crops on the basis of the averages. As a matter of fact there were wide variations in the cost of producing each of the seven crops. The average is merely the "point about which the individual costs are scattered."

Tables 46 to 52 are designed to show the variation in the cost of producing a unit of each of the seven crops for each year of the study and the average yields of the respective crops on farms falling within the different cost groups; that is, on farms producing these crops at different costs. These tables present a wide variation in the cost of producing a unit of each crop. For example, the cost of producing wheat during the three years varied from less than 80 cents per bushel to over $3. The variation in the cost per unit for each of the other crops is equally striking. High average yields, these tables show, are very uniformly associated with low costs per unit and low average yields with high costs.

TABLE 46.—*Variation in the net cost per bushel of producing wheat*

Variation in cost per bushel	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Dollars		*Bushels*		*Bushels*		*Bushels*
0.60 to 0.79					2	79
.80 to .99					27	51
1.00 to 1.19	1	51	3	75	30	47
1.20 to 1.39	10	50	7	47	28	46
1.40 to 1.59	9	46	8	48	20	38
1.60 to 1.79	16	42	12	44	6	38
1.80 to 1.99	14	38	7	40	2	36
2.00 to 2.19	8	34	3	33	4	28
2.20 to 2.39	5	31	1	42	2	33
2.40 to 2.59	1	27			1	30
2.60 to 2.79	2	29	1	30		
2.80 to 2.99			1	23		
3.00 and over					2	16

TABLE 47.—*Variation in the net cost per ton of producing alfalfa hay*

Variation in cost per ton	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Dollars		*Short tons*		*Short tons*		*Short tons*
5 to 6.9					2	5.5
7 to 8.9	1	6.0			10	4.5
9 to 10.9	6	5.8	1	5.0	28	4.2
11 to 12.9	9	4.8	8	4.8	26	4.0
13 to 14.9	11	4.6	9	4.2	18	3.9
15 to 16.9	11	3.8	9	3.6	6	3.3
17 to 18.9	5	3.5	3	3.2	4	3.0
19 to 20.9					2	3.0
21 to 22.9	2	3.5	5	3.1	2	2.9
23 and over	3	2.3	2	3.3	1	2.0

TABLE 48.—*Variation in the net cost per ton of producing sugar beets*

Variation in cost per short ton	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Dollars		*Short tons*		*Short tons*		*Short tons*
7 to 8.9	5	14.8	6	18.1	14	12.4
9 to 10.9	4	15.0	7	15.7	14	9.3
11 to 12.9	7	11.0	8	12.3	4	7.7
13 to 14.9	3	9.0	10	11.2	4	6.5
15 to 16.9	8	7.4			2	7.3
17 to 18.9	2	7.1	5	7.7	2	5.6
19 to 20.9	2	7.5	3	6.9		
21 to 22.9	1	6.7				
23 to 24.9	2	5.5				
25 to 26.9	3	5.0			1	3.2
27 and over					5	1.8

TABLE 49.—*Variation in the net cost per hundredweight of producing potatoes*

Variation in cost per hundredweight	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Dollars		*100 lbs.*		*100 lbs.*		*100 lbs.*
0.50 to 0.69	1	256			16	180
0.70 to 0.89	12	212	1	246	22	146
0.90 to 1.09	11	157	8	208	5	116
1.10 to 1.29	7	122	3	204	4	122
1.30 to 1.49	5	90	4	148	1	57
1.50 to 1.69			2	184	1	119
1.70 to 1.89	2	93	3	110		
1.90 to 2.09	2	66	2	108	1	42
2.10 to 2.29			2	96		
2.30 to 2.49	1	64	2	76		
2.50 to 2.69	1	55	1	80		

TABLE 50.—*Variation in the net cost per pound of producing beans*

Variation in cost per pound	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Cents		*Pounds*		*Pounds*		*Pounds*
2 to 3.9					6	1,981
4 to 5.9	12	1,561	6	1,786	14	1,355
6 to 7.9	16	1,201	13	1,356	6	1,026
8 to 9.9	10	984	9	1,158	7	758
10 to 11.9	4	743	1	1,198	2	678
12 to 13.9	1	506	2	694		
14 to 15.9					2	533
16 and over	1	270	4	404	4	224

TABLE 51.—*Variation in the net cost per pound of producing red-clover seed*

Variation in cost per pound	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Cents		*Pounds*		*Pounds*		*Pounds*
5 to 14.9	5	493	1	332	9	359
15 to 24.9	8	320	5	342	27	231
25 to 34.9	6	181	9	230	9	159
35 to 44.9			3	155	3	149
45 to 54.9			1	116	4	109
55 to 64.9	1	77	1	70		
65 and over	1	80	1	44	3	81

TABLE 52.—*Variation in the net cost per pound of producing alsike-clover seed*

Variation in cost per pound	1919		1920		1921	
	Number of records	Average yield per acre	Number of records	Average yield per acre	Number of records	Average yield per acre
Cents		*Pounds*		*Pounds*		*Pounds*
10 to 14.9	1	452	1	625	8	443
15 to 19.9	5	326	5	468	4	324
20 to 24.9					1	300
Over 25	2	187	2	276	1	141

COST PER UNIT ON FARMS HAVING DIFFERENT YIELDS

The cost records of the seven crops are arranged in Tables 53 to 59 in groups according to yield per acre. These tables show the variation in the yield of each crop; the number of records falling within each yield group; and the average cost per unit on the farms having different yields.

Wheat ranged in yield from as low as 16 bushels per acre to as much as 93 bushels; alfalfa hay (three cuttings) from 2.2 to 7 tons; potatoes from 42 to 260 hundredweight; beans from 106 to 2,455 pounds; sugar beets from 1.5 to 22.5 tons; red-clover seed from 55 to 720 pounds; and alsike-clover seed from 141 to 625 pounds.

Low yields go hand in hand with high cost per unit of product and high yields with low cost per unit. The exceptions are due to the fact that yield per acre is not always the dominant factor in determin-

ing cost per unit. The expense involved in the cost of producing any crop, for example, may be sufficiently high to counteract the effect of high yield. The importance of obtaining high yields should be apparent from a study of Tables 46 to 59. The possibility of increasing crop yields on many of the farms studied should also be evident from a consideration of these tables.

TABLE 53.—*Cost per bushel of producing wheat on farms having different yields*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per bushel	Number of records	Average yield per acre	Average cost per bushel	Number of records	Average yield per acre	Average cost per bushel
Bushels		*Bushels*	*Dollars*		*Bushels*	*Dollars*		*Bushels*	*Dollars*
Under 20							2	16	3.74
20 to 24.9				1	23	2.94			
25 to 29.9	4	26	2.18				2	26	2.07
30 to 34.9	13	33	2.08	5	32	1.98	12	32	1.65
35 to 39.9	6	37	1.87	6	38	1.85	14	37	1.37
40 to 44.9	20	42	1.76	9	42	1.64	21	42	1.23
45 to 49.9	14	47	1.52	12	46	1.59	27	47	1.11
50 to 54.9	6	52	1.33	4	52	1.43	27	52	1.07
55 to 59.9	3	56	1.35	1	57	1.46	10	56	1.13
60 to 64.9				2	63	1.45	4	62	.98
65 to 69.9							3	67	1.03
70 to 74.9				2	72	1.22	1	71	.69
75 and over				1	93	1.14	1	87	.76

TABLE 54.—*Cost per ton of producing alfalfa hay on farms having different yields.*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per short ton	Number of records	Average yield per acre	Average cost per short ton	Number of records	Average yield per acre	Average cost per short ton
Short tons		*Short tons*	*Dollars*		*Short tons*	*Dollars*		*Short tons*	*Dollars*
2.0 to 2.49	2	2.2	35.31	1	2.4	22.13	2	2.1	21.92
2.5 to 2.99	2	2.7	19.53	3	2.8	22.24	2	2.7	19.94
3.0 to 3.49	2	3.3	17.48	9	3.2	18.85	15	3.1	15.06
3.5 to 3.99	7	3.6	16.68	3	3.6	19.20	8	3.7	11.09
4.0 to 4.49	13	4.2	13.83	8	4.1	14.32	41	4.0	11.31
4.5 to 4.99	3	4.5	15.69	7	4.6	12.65	10	4.6	10.63
5.0 to 5.49	14	5.0	12.69	6	5.1	12.69	19	5.0	10.27
5.5 to 5.99	1	5.5	11.03				2	6.0	8.77
6.0 to 6.49									
6.5 to 6.99	2	6.0	9.50						
7.0 to 7.49	2	7.0	9.90						

TABLE 55.—*Cost per ton of producing sugar beets on farms having different yields*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per short ton	Number of records	Average yield per acre	Average cost per short ton	Number of records	Average yield per acre	Average cost per short ton
Short tons		*Short tons*	*Dollars*		*Short tons*	*Dollars*		*Short tons*	*Dollars*
Under 2							2	1.5	46.25
2 to 3.9							4	2.6	29.58
4 to 5.9	3	4.6	25.42	1	5.7	19.56	3	5.2	14.66
6 to 7.9	12	7.1	17.49	4	6.9	18.09	9	7.2	12.54
8 to 9.9	6	9.0	13.80	4	9.3	14.27	9	8.8	9.77
10 to 11.9	5	11.3	13.10	11	11.0	13.54	9	11.0	9.14
12 to 13.9	3	13.4	9.02	6	13.2	12.33	8	13.1	7.58
14 to 15.9	6	14.9	8.91	5	15.0	10.31	1	15.8	7.87
16 to 17.9	2	16.2	9.97	3	16.9	9.13	1	17.6	7.36
18 to 19.9				1	18.3	10.91			
20 to 21.9				3	20.6	8.76			
22 to 23.9				1	22.5	7.41			

TABLE 56.—*Cost per 100 pounds of producing potatoes on farms having different yields*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per 100 pounds	Number of records	Average yield per acre	Average cost per 100 pounds	Number of records	Average yield per acre	Average cost per 100 pounds
100 pounds		*100 pounds*	*Dollars*		*100 pounds*	*Dollars*		*100 pounds*	*Dollars*
25 to 49							1	42	2.04
50 to 74	3	60	2.37	1	65	2.36	1	57	1.40
75 to 99	6	86	1.46	4	88	2.11			
100 to 124	8	110	1.21	6	112	1.84	13	115	.99
125 to 149	7	138	1.09				9	128	.86
150 to 174	5	163	.99	4	168	1.32	11	168	.68
175 to 199	4	191	.91	3	184	1.32	9	183	.68
200 to 224	3	218	.83	6	208	.97	5	206	.71
225 to 249	4	231	.76	4	241	.94			
250 to 274	2	260	.72				1	251	.56

TABLE 57.—*Cost per pound of producing beans on farms having different yields*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per pound	Number of records	Average yield per acre	Average cost per pound	Number of records	Average yield per acre	Average cost per pound
Pounds		*Pounds*	*Cents*		*Pounds*	*Cents*		*Pounds*	*Cents*
Under 300				1	281	26	2	106	64
300 to 499	1	270	35	1	325	29	3	375	18
500 to 699	2	537	13	3	568	20	5	587	11
700 to 899	6	895	9	1	716	14	4	755	9
900 to 1,099	13	974	8	4	1,002	8	4	1,030	8
1,100 to 1,299	8	1,196	7	11	1,196	8	10	1,230	5
1,300 to 1,499	6	1,415	6	4	1,400	8	3	1,389	5
1,500 to 1,699	4	1,561	5	3	1,589	6	5	1,639	4
1,700 to 1,899	1	1,824	5	5	1,779	5	1	1,777	3
1,900 to 2,099	3	1,963	5	1	2,082	4	3	2,011	3
2,100 and over				1	2,400	5	1	2,455	3

TABLE 58.—*Cost per pound of producing red-clover seed on farms having different yields*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per pound	Number of records	Average yield per acre	Average cost per pound	Number of records	Average yield per acre	Average cost per pound
Pounds		*Pounds*	*Cents*		*Pounds*	*Cents*		*Pounds*	*Cents*
Under 100	2	79	67	2	55	78	5	82	55
100 to 199	3	136	26	7	155	38	19	158	29
200 to 299	6	248	23	8	247	28	19	252	20
300 to 399	6	326	17	2	313	24	8	325	17
400 to 499	2	423	16	2	454	18	3	464	11
500 to 599							1	543	12
600 to 699	1	620	8						
700 to 799	1	720	8						

TABLE 59.—*Cost per pound of producing alsike-clover seed on farms having different yields*

Variation in yield per acre	1919			1920			1921		
	Number of records	Average yield per acre	Average cost per pound	Number of records	Average yield per acre	Average cost per pound	Number of records	Average yield per acre	Average cost per pound
		Pounds	*Cents*		*Pounds*	*Cents*		*Pounds*	*Cents*
100 to 199	1	154	34				1	141	28
200 to 299				2	276	26	2	232	17
300 to 399	2	252	20	2	375	18	4	360	16
400 to 499	5	440	15	2	436	17	4	444	14
500 to 599				1	521	16	3	551	14
600 to 699				1	625	14			

COST OF HORSE LABOR

The cost of maintaining work horses is one of the important items of expense in the operation of irrigated farms in southern Idaho. Furthermore, the cost per hour of horse labor probably varies as much from farm to farm as does any other item of expense. This variation, it appears, is due largely to two factors: The crop enterprises of some of the farms studied were so organized as to require a large amount of horse labor per farm, whereas the organization of other farms required but little horse labor. In the second place the number of horses kept on farms of the same size varied widely. For example, the number of work horses kept per farm varies from two to six and from two to eight, respectively, on strictly 40-acre and 80-acre farms. Table 60 presents a summary of the study of the cost of horse labor.

The 151 farms from which the records were obtained varied in size from 20 to 240 acres and the number of horses kept per farm from 2 to 12. The average size of farm was 75 acres and the average number of work horses per farm 4.7. There was an average of 14 crop-acres per work horse.

TABLE 60.—*Cost of maintaining work horses and cost of direct horse labor per hour, 1921* [1]

Number of farms on which horse labor was studied	151
Average number of horses per farm	4.7
Variation in number of horses per farm	2 to 12
Average value per horse	$94
Average crop-acres per work horse	14
Average hours of direct labor per work horse	703
Average cost per horse per year	$55.15
Feed per horse per year	34.98
Alfalfa hay, 5.43 tons	27.40
Clover straw, 0.07 tons	.10
Grain (oats, barley, or corn), 273 pounds	3.03
Pasture, 2.1 months	4.45
Other costs	20.17
Depreciation	9.50
Veterinary	.78
Shoeing	1.36
Taxes and insurance	1.95
Interest, at 7 per cent	6.58
Average cost per hour of direct labor	.078

[1] Shelter and labor caring for horses not included. No credit was given the horses for the manure produced. All averages are weighted

Exclusive of the value of shelter and the labor used in caring for the work stock, the average maintenance cost per horse for the farm year, March 1, 1921, to March 1, 1922, was $55.15. Shelter was a small item, since most of these farms have cheaply constructed stables. The chore labor spent on the work animals was carried as overhead expense in the crop-cost studies. Feed, it is seen, constituted 63 per cent of the average maintenance cost per horse. Of the total value of the feed consumed per horse per year, alfalfa hay was 78 per cent, pasture 13 per cent, and grain nearly 9 per cent. Alfalfa hay, being low in value that year (about $5 per ton), was fed liberally; that is, at the rate of 5.43 tons per horse. During the year the horses were on pasture an average of 2.1 months. The horses worked an average of 703 hours per year, and the average cost per hour was 7.8 cents.

RELATION BETWEEN THE AVERAGE HOURS OF LABOR PERFORMED ANNUALLY PER HORSE PER FARM AND THE COST OF DIRECT HORSE LABOR PER HOUR

The average hours of direct labor performed per horse per year on the different farms varied from 221 to 1,535. The cost of an hour of direct horse labor on the respective farms also varied from about 4 to 22 cents per hour. Figure 22 is presented to show the relation of these two variables. From the position of the dots on the chart the relation, it is seen, is fairly close. In most cases high hours of labor per horse per year are associated with low costs and low hours of labor with high costs. In other words, some of the farms were so organized that the horses were kept busy during much of the spring, summer, and fall months. On other farms there were too many horses for the amount of work to be done. The somewhat scattered positions of the dots on the chart indicate that there were other factors affecting the cost per hour of labor. Figure 22 indicates very clearly, however, that the wide variation in the cost of horse labor from farm to farm is in part responsible for the variation in the cost per acre and per unit of the seven crops.

VARIATION IN THE COST OF MAN LABOR PER HOUR

Man labor was one of the heavy items of expense included in the cost of producing each of the seven crops. In 1921 the cost of a direct hour of man labor was computed for each farm used in the cost studies by dividing the total cost of man labor per farm by the total hours of labor expended on the productive enterprises. Figure 23 is presented to show the variation in the cost per hour of man labor that existed from farm to farm.

The lowest average cost of direct man labor per farm was 21 cents per hour and the highest 64 cents. More of the costs fell between 35 and 39 cents, inclusive, than in any other 5-cent group. Figure 23 represents 147 farms. In addition there were 5 other farms having average costs for man labor ranging from 71 to 94 cents. The wide variation in the cost of man labor was due to a variety of causes. Some farms furnished an abundance of man labor, whereas others did not; some had no more man labor than was needed, whereas others had too much; some farm operators had the work of the farm well planned and efficiently directed the labor at their disposal, whereas others were less successful as managers. As a result of these conditions the cost of man labor was much higher on some farms than on others.

SOME OTHER FACTORS THAT AFFECT COSTS

Of the 152 farms used in the cost studies 134 had automobiles. The automobile charge per crop acre ranged from $1 to $10. The charge was very generally larger on the small farms than on the larger ones; that is, the small farm requires about as much running about with the automobile as the large farm, and per crop acre the small farm is at a disadvantage.

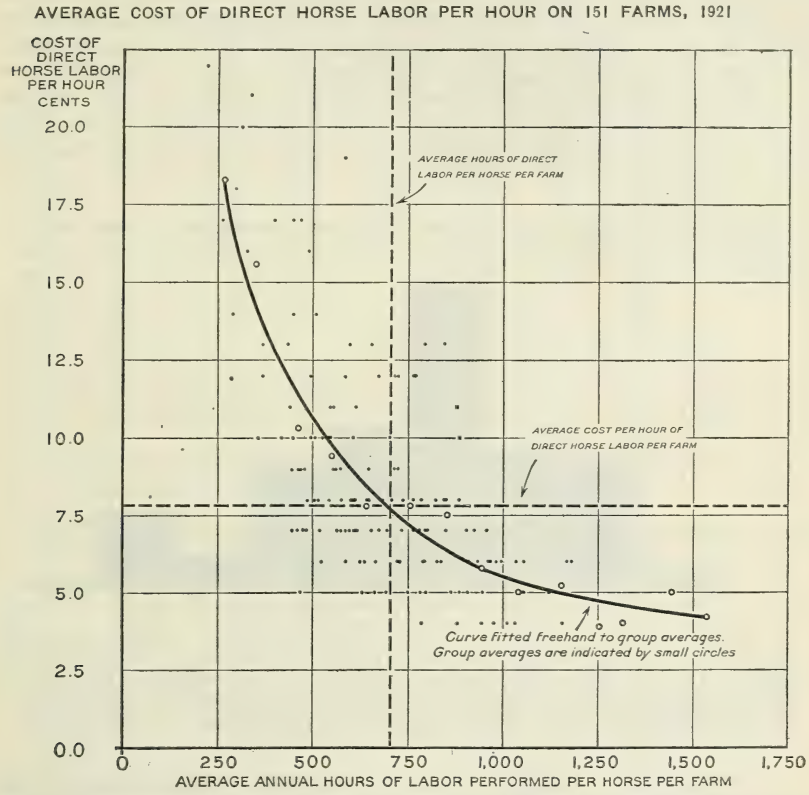

FIG. 22.—By its position on the chart each dot represents (1) the average hours of work performed annually per horse and (2) the average cost of a direct hour of horse labor on an individual farm in 1921. The small circles represent group averages having class limits of 100 hours. On some of the farms studied there were more than twice as many work horses as were needed to do the farm work. Hence the wide variation in the cost of horse labor per hour

In the cost studies taxes varied from a little less than $2 per crop acre to as much as $12. The wide variation in taxes was mainly due to the school and road districts in which the respective farms were located.

The interest charged against each of the crops for the use of land and equipment varied from less than $11 per crop acre to $38. Interest reflects in a general way the different grades of land. It is very probable, however, that some of the land was overvalued and some undervalued.

NET RETURNS PER ACRE FROM SEVEN CROPS

Table 61 presents averages of the following items for the seven crops: Yield per acre, prices received per unit of product sold, gross acre values, net costs per acre, and net returns per acre. The average yields, prices received per unit of product, and gross values per acre for 1922 were obtained from the farm survey records. The net costs per acre for 1922 were computed by the method outlined in the discussion of Table 63. The average price received per unit of product equals the total amount received divided by the amount sold. Gross value per acre is average yield times average price received. Net cost per acre includes interest on the estimated capital involved at 7 per cent and wages for all unpaid labor. Net returns per acre is gross value per acre less net cost per acre. The minus signs in Table 61 indicate that the cost per acre was greater than the gross value.

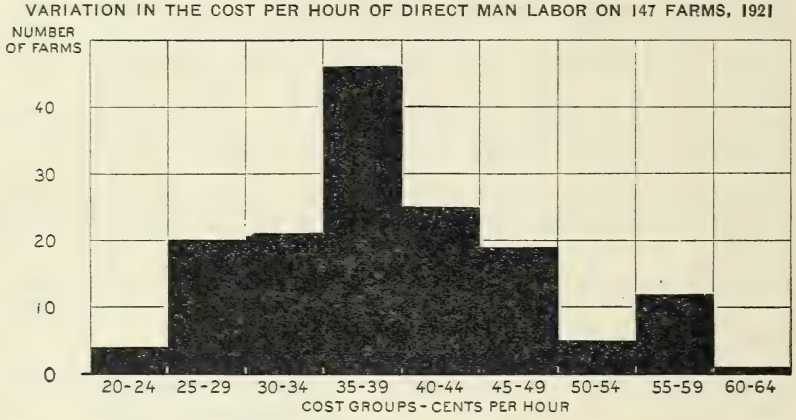

FIG. 23.—Variation in the cost per hour of direct man labor on 147 farms, 1921. The farms here represented are arranged in 5-cent cost groups (see figures at the bottom of the chart). The figures at the left show the number of farms falling within the respective man-hour cost groups. There was a very wide variation in the average cost of an hour of direct man labor per farm. At the extreme left the chart shows four farms on which the cost was between 20 and 24 cents per hour, and at the extreme right one farm is shown on which the cost was between 60 and 64 cents. The 35 to 39 cent cost group contained nearly twice as many farms as any other cost group

A consideration of wheat in Table 61 should assist in making net returns per acre clear. This crop made a net return of $7 per acre in 1919, but in 1920, 1921, and 1922 there were net losses of $12, $17, and $7 per acre, respectively; that is, the average gross value of an acre of wheat exceeded the average net costs approximately $7 in 1919, whereas in 1920, 1921, and 1922 the net costs exceeded the average gross value $12, $17, and $7, respectively.

Table 61 shows a very wide variation in the net returns per acre of the seven crops during the four years and Table 62 shows how these crops ranked in the net returns per acre during the same period. No crop made the highest net return each of the four years; neither did any crop make the lowest return each year. Potatoes stood first in 1919 and 1921 and lowest in 1920 and 1922; sugar beets were lowest in 1919 and 1921, second highest in 1920, and highest in 1922. Variations in the prices received, the yields obtained from year to year, and costs per acre are the outstanding factors which contribute

to the variation in the net return per acre of the seven crops during the four-year period. The data at hand were not sufficient to permit a study of the effect of crop combinations on costs per acre and per unit of product.

TABLE 61.—*Average net returns per acre of designated crops, 1919–1922* [1]

Item	Wheat	Alfalfa hay	Sugar-beets	Potatoes	Beans	Red-clover seed	Alsike-clover seed
Average yields per acre:	*Bushels*	*Short tons*	*Short tons*	*100 pounds*	*Pounds*	*Pounds*	*Pounds*
1919	41.4	4.3	9.9	140.1	1,210	302	316
1920	43.3	3.9	13.5	167.9	1,273	226	431
1921	45.4	4.0	10.0	150.6	1,175	211	353
1922	47.0	4.1	17.7	[2] 185.0	1,953	325	245
Average prices received per unit:	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Cents*	*Cents*	*Cents*
1919	1.850	15.63	11.00	1.770	7.0	45.6	39.0
1920	1.380	8.37	12.00	.945	5.7	12.0	22.3
1921	.825	4.80	6.00	.935	4.2	15.0	15.1
1922	.830	6.88	8.39	.440	4.3	16.2	12.9
Average gross values per acre:					*Dollars*	*Dollars*	*Dollars*
1919	77	67	109	248	85	138	123
1920	60	33	162	159	73	27	96
1921	37	19	60	141	49	32	53
1922	39	28	149	73	84	53	32
Average net costs per acre:							
1919	70	61	129	149	82	53	57
1920	72	61	149	209	94	65	74
1921	54	47	98	117	67	49	55
1922	46	41	91	111	65	38	44
Average net return per acre:							
1919	7	6	−20	99	3	85	66
1920	−12	−28	13	−50	−21	−38	22
1921	−17	−28	−38	24	−18	−17	−2
1922	−7	−13	58	−38	19	15	−12

[1] Costs for 1922 computed by applying current prices to the data presented in Table 63.
[2] Ninety per cent considered marketable and 10 per cent culls.

TABLE 62.—*Rank of designated crops in net return per acre as determined by cost-of-production study, 1919–1922*

Rank in net return per acre	1919	1920	1921	1922
1	Potatoes	Alsike clover	Potatoes	Sugar beets.
2	Red clover	Sugar beets	Alsike clover	Beans.
3	Alsike clover	Wheat	Wheat	Red clover.
4	Wheat	Beans	Red clover	Wheat.
5	Alfalfa	Alfalfa	Beans	Alsike clover.
6	Beans	Red clover	Alfalfa	Alfalfa.
7	Sugar beets	Potatoes	Sugar beets	Potatoes.

Relative net return per acre, it should be understood, is only one of the many factors that should be considered in choosing crop enterprises. High net return per farm is usually obtained from a combination of enterprises that utilize the farm equipment and available labor to advantage. A single crop or livestock enterprise, however, may be so remunerative that the combination of enterprises with a view of fully utilizing the available labor and farm equipment becomes of secondary importance.

Attention is here directed to the fact that in computing the cost data presented herewith, each crop was charged with 7 per cent interest on the capital involved and with going wages for all labor performed. Under this method of computing costs a farm that broke even, that is, produced these crops with a zero profit on the average, may be considered as successful.

A METHOD OF ESTIMATING COSTS

The hours of labor and the quantities of materials used in the production of an acre of each of the seven crops, averaged for the three years, 1919–1921, are shown in Table 63. The amounts paid out for contract labor and job labor were converted into their labor equivalents by using 45 cents per hour for man labor and 20 cents per hour for horse labor in 1919 and 1920 and by using 30 cents per hour for man labor and 12.5 cents per hour for horse labor in 1921. The hours of labor thus obtained for the contract and job labor plus the hours of labor shown in Table 44 equal the total hours of direct labor presented in Table 63.

Table 63 also shows for each crop what percentage the combined cost of labor and materials is of the total operating cost, and what percentage interest on real estate per acre is of the total interest charge. By applying current prices to the quantities of labor and material shown in this table, the operating cost of producing an acre of each of the crops may be estimated very closely for any given year. The interest charge may be computed in the same way by deciding upon the value of real estate per acre and the rate of interest to be allowed.

TABLE 63.—*Three-year average hours of labor and quantities of materials used per acre in the production of designated crops, 1919–1921*

Item	Wheat	Alfalfa hay	Sugar beets	Potatoes	Beans	Red-clover seed	Alsike-clover seed
Direct labor per acre: [1]							
Man labor, hours	25.1	30.8	131.6	101.4	57.2	24.9	21.7
Horse labor, hours	44.3	32.0	117.6	100.2	57.1	22.6	15.1
Material per acre:							
Seed—pounds	101.0	10.4	15.8	983	65.7	8.60	6.50
Twine—do	3.7			1.2	.07	.02	.03
Sacks—number	.6			141	2.90	2.00	2.90
Fuel—tons	.04				.05	.07	.07
Manure—loads	.6		4.9	.6	1.33		
Irrigation water [2]							
Total operating expense represented by labor and materials at current rates—per cent	60	65	78	78	64	55	50
Total interest charge represented by interest on real estate per acre—per cent	95	97	92	91	94	97	98

[1] As here used direct labor includes contract labor, whereas in Table 2 contract labor is expressed in dollars.
[2] To the value of the materials listed at current rates for the year in question add the cost of water per acre. The cost of water per acre equals the total cost of water per farm divided by the acres irrigated.

Suppose, for example, that the hours of man and horse labor and the quantities of materials given in Table 63 for producing an acre of wheat when charged at current rates amount to $18 per acre for some given year. Since Table 63 shows this to be 60 per cent of the total operating expense, the total operating expense would be $30 per acre. Suppose further that the value of the land on which the wheat is grown is $200 per acre and that the interest rate is 7 per cent. The interest charge per acre for the use of real estate would then be $14. Since this is 95 per cent of the total interest charge, the total would be $14.75 per acre. The total cost of producing an acre of wheat for the year in question would then equal $30 (the operating cost), plus $14.75 (the interest charge), or $44.75. This amount, less the value of the crop credits (the value of the straw and pasture of the stubble field), should give the net cost per acre about as closely as it is possible to estimate costs in advance.

SUMMARY AND CONCLUSION

The Twin Falls south side irrigation project is a very uniform body of land. The topography varies from nearly level to gently rolling. The average elevation of the project is around 3,700 feet and a little more than 200,000 acres is under irrigation.

The soil is a very uniform silt loam that is well supplied with lime, phosphorus, and potash. Like most western arid soils, however, it is somewhat deficient in organic matter and nitrogen.

The average annual precipitation is about 11 inches. The rainfall of the summer months is exceptionally scant, and no crops are grown without irrigation. On the average there are 129 days between the last killing frost in the spring and the first in the fall.

Water was first turned into the irrigating ditches in the spring of 1905. Twenty years of farm experience has shown that so far as natural resources are concerned the project is well adapted to the production of a wide range of field crops, fruits, and vegetables as well as to sheep, hog, cattle, poultry, and dairy farming.

The project is a surplus-producing district and the bulk of the farm products must be shipped to distant markets. For this reason transportation charges play an important part in determining what enterprises can be followed most profitably.

The economic study of irrigated farming in Twin Falls County reported herewith covered a four-year period, 1919–1922. This was a very unstable period during which prices of farm products fluctuated widely. For this reason much of the data presented here must be used with caution except when applied to the period covered by this study.

The farms studied are located within 10 miles of the city of Twin Falls. They varied in size from 17 to 345 acres. The most frequent sizes of farm found are 40-acre, 80-acre, and 20-acre, in the order named.

Cash crop farming strongly predominated in this district during the period of the study. Of the total number of farms studied, 87 per cent were classified as general crop farms, 7 per cent as dairy and general crop farms, and 6 per cent as orchard and general crop farms. The orchard and general crop farms carried very little productive livestock.

Of the three types, the dairy farms made the highest average net return to capital for the four-year period and the orchard farms, the second highest. When measured by the percentage return to capital, the orchard farms ranked highest in 1919 and 1921 and lowest in 1920 and 1922; and the dairy farms highest in 1920. Dairy farming, during the four years, was far more stable than either of the other types; the orchard farming was the least stable.

Size of farm had considerable influence on the economical organization and operation of the general crop farms. For example, the 40-acre group of farms had 5 per cent more of the total capital tied up in buildings and equipment than had the 80-acre group. One and one-half times as many crop acres were handled per work horse on the 80-acre farms as on the 40-acre farms. For each month of man labor used, 4.2 acres of crops were taken care of on the 80-acre farms as compared with 2.8 acres for the 40-acre group. The average crop yield was slightly higher on the 40-acre farms. The advantage of the larger farms is reflected, at least in part, by the net return per acre for the use of real estate. This, for the four-year period, averaged approximately $14 for the 80-acre farms and $8 for the 40-acre group.

The percentage return to capital, the yield per acre of each crop studied, and the cost per acre and per unit of product of producing these crops varied widely during each year of the study. Each year some farms were highly successful, whereas others were equally unsuccessful. High average crop yields per farm are very generally associated with low cost per unit of product and high percentage return to capital and low average yields with low return to capital and high cost per unit of product.

Relatively high crop yields, it appears, may be obtained by giving the legumes, especially alfalfa, a prominent place in the cropping system, by a liberal use of barnyard manure, by planting only the best seed, and by the well-timed performance of the cultural operations. The percentage of the crop acreage devoted to alfalfa and clover varied greatly on these farms, the average being around 30 per cent.

If the acreage of alfalfa is increased because of its effect on crop yields, it will be necessary to feed more range sheep and cattle or to increase the livestock kept on the farms in order to utilize the additional hay produced. Farmers who are inexperienced in the handling of dairy cattle, sheep, or hogs should develop these enterprises gradually. It is far safer to start with a few cows, a few ewes, or a few brood sows and gain experience as each enterprise is developed than to expand these lines suddenly.

In a long-time program it will probably pay to keep approximately about half of the farm in alfalfa and pasture, feed the hay produced to livestock, and return the manure to the soil. The alfalfa should be rotated systematically over the farm, occupying each piece of land on which it is sown from three to four years. The pasture should be changed to a different location every few years.

Considerable freedom can be exercised in the choice of the crops to be grown on that portion of the farm not devoted to alfalfa and to pasture. The four row-tilled crops grown in this district (potatoes, beans, sugar beets, and corn) all serve much the same purpose in the crop rotation for cleaning the land. In deciding what to grow, the choice should be based largely on (1) the anticipated prices that are likely to prevail when the products are ready for market, (2) the estimated yields that can be obtained, (3) the labor, materials, and other items of cost that must be expended in the production of each crop, (4) the effect that each crop has on the yield of subsequent crops, and (5) the effect that the growing of each crop has on the distribution and utilization of the available farm labor.

Because money costs vary considerably from year to year, special attention was given in this study to the quantities of labor and materials used in the production of an acre of each of the seven crops. Since the hours of labor and the quantities of materials required per acre remain fairly constant, the cost of producing an acre of each crop may be estimated very closely for any given year by applying current prices to these quantities (Table 63).

The farmers of this district must choose from some 8 or 10 crops and the different kinds of livestock in deciding what to produce. This choice can not be made once for all time. The prices of the various farm products are changing more or less constantly. These price changes cause corresponding changes in the relative profitableness of the different lines of production. For this reason the problem of deciding what and how much to produce comes up for solution year after year.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

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